Dr. T's Keyboard Controlled Sequencer

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Chapter 1

Getting Started

Thank you for purchasing Dr. T's Keyboard Controlled Sequencer for the Atari ST or Commodore Amiga. You now own the most powerful music processing program available at this time. Before reading this manual, check your disk directory for a file entitled README. If one exists, print or view the file before diving into the manual. This file contains any corrections or additions to this manual which were made after it went to press. This manual is current for version 1.6 of the KCS.

If you haven't already done so, turn to Appendix 1 of this manual and read it carefully. This appendix contains important information on obtaining backups, warranty service, and customer support. We have made every effort to test the program and eliminate serious software bugs. Still, there is always some possibility that bugs exist. We suggest that you become thoroughly familiar with the program before using the sequencer on stage. Dr. T's Music Software assumes NO RESPONSIBILITY for losses caused by software errors or other problems in using the program!

How to Use This Manual

The Keyboard Controlled Sequencer is a program which operates in three modes and performs several independent, yet inter-related, functions. Our philosophy in designing this program has been to give the musician a wide variety of methods for creating and manipulating music, while imposing a bare minimum of restrictions on the form of that music. This allows each user to develop a unique method of creating music, without regard to our own ideas of what form the music should or should not take.

In addition to this chapter, the manual contains two short tutorial chapters, chapters describing the six editing and play screens of the program, chapters on disk operations and sequencer options, and several chapters of application notes and general information. We recommend that you start by reading this chapter and the tutorials, followed by Chapter 4 (OPEN AND TRACK MODE EDITING) for more information on editing, and Chapter 11 (SET OPTIONS) for information on the sequencer's operating parameters. Refer to the other chapters as the need arises. Once you become familiar with all the features of the Keyboard Controlled Sequencer, you will develop your own method of using it, depending on the equipment you are using and your own personal approach to music.

Program Overview

The Keyboard Controlled Sequencer provides three distinct modes of operation: **Track mode, Open mode,** and **Song mode.** In Track mode, the program acts as a 48 track tape recorder with many special functions that make it far more powerful than an actual tape deck. Open mode is a more generalized sequencing system which allows for completely independent looping of up to 128 separate sequences. Song mode is used to chain sequences created in Track and Open modes into complete songs, much like a drum machine.

The three modes allow different approaches to be used for different pieces of music, depending on the requirements of the piece or the mood of the composer. An entire song can be done in Track or Open mode without ever going to the other two modes, or a composition could be started in one mode, edited in another, and completed in a third mode. Individual notes, phrases, sequences, or entire songs can be easily transferred between the various modes using special copy commands, or with cut and paste techniques. Sequences and tracks can also be merged, unmerged, split, or appended to other sequences or tracks.

Sequences and tracks can contain any type of MIDI data, including note data, continuous controllers, pitch bend, aftertouch, system exclusive messages, and real time commands. Tempo changes can be added at any point in a track or sequence. In addition, Open mode sequences can contain events which start, stop, and otherwise influence other Open mode sequences. This provides a means for creating music of enormous complexity, or it can be used simply as an alternate method for creating traditional song structures.

Each mode has its own edit and play/record screens. While each edit screen has some unique features, many of the editing commands, as well as the overall operation of the edit screens, are similar in all three modes. The three play screens each have their own special methods for interacting with a sequence as it is playing.

Which mode you choose for a given piece of music will depend on your level of familiarity with the program, as well as the requirements of the piece. Users who are familiar with the Commodore or Apple versions of the KCS will probably want to dive right into Open mode, to take advantage of its expanded structuring capabilities. If you are new to sequencing but are familiar with multi-track tape recording, you may want to work exclusively in Track mode until you have finished a couple of small pieces. Once you feel comfortable with Track mode, you can transfer your tracks to Open mode for assembly into songs, either in Song mode or, after you've gained more experience, with Open mode **control sequences**. We do some of our pieces exclusively in Track mode, other pieces in Track and Song modes, and other pieces using the generalized control structure of Open mode.

The KCS supports a number of load and save operations, for maximum flexibility in transferring music from one file to another. Individual songs, tracks, and sequences may be saved, all 48 tracks may be saved as a block, or the entire contents of memory may be saved. MIDI files are supported via an external conversion program, and the settings of a number of important playback and record options can be saved in an "environment" file. As with any piece of software, it is a good idea to periodically save a copy of your work to disk in case of an accident. Any job which takes more than 15 minutes is probably worth backing up, and you should also keep alternate takes of pieces in progress, as well as archive copies of completed works.

Open Mode Sequences

A sequence in Open mode may contain any type of MIDI data or commands to start or stop other sequences. Sequences are divided into two types, **primary** and **secondary**. There are 35 primary sequences, designated by the single numerals 1 - 9, and the letters A - Z. Primary sequences can be started and stopped from the Open mode play screen by pressing the appropriate alphabetic or numeric key. The remaining 93 sequences are called secondary sequences and are designated by two digit numbers, from 00 through 92. These sequences may be started from the Open mode play screen by pressing two digits on the numeric keypad. The playback of both primary and secondary sequences may be independently controlled in real time using the computer keyboard, and as many sequences as desired can be played simultaneously.

The KCS contains two reserved sequences, sequence Y and sequence Z. Sequence Y is used from the edit screen by the BACKUP function. The program will not let you create or edit sequence Y, but you may play or append an existing sequence Y. Sequence Z is used as an automatic backup for certain editing functions, and is not accessible to the user.

Using the Keyboard and Mouse

The Atari ST and Amiga keyboards consist of a basic typewriter layout with a row of ten function keys above, a group of cursor control and editing keys to the right, and further right, a numeric keypad. Dr. T's Keyboard Controlled Sequencer uses the mouse to move the edit cursor, to access the various options on all three edit screens, to control playback from the edit screens, and to control playback and recording in Track mode. Clicking the left mouse button selects the option under the mouse pointer or places the edit cursor at that point, while clicking the right mouse button, or both buttons at once, selects a play option. When we use the expression "Click the mouse on xxx", we are asking you to move the mouse pointer to xxx and then to click the left button. "Double click" means to click the appropriate button twice in quick succession.

The computer keyboard is used heavily on the various play and record screens. The functions of the keys vary from screen to screen, and are described in detail in Chapters 6 - 9, and summarized in the Appendix. When selecting tracks or sequences on the play and record screens, numerals on the numeric keypad will not have the same effect as the numerals on the typewriter keyboard. Function keys F11 - F20 are accessed by pressing SHIFT and F1 - F10. The function of the F10 key is also duplicated throughout the program by the SPACE bar. In many cases, the RETURN and ENTER keys will perform the same function, though there are some parts of the sequencer in which these keys act differently. Such instances will be pointed out in the manual, as well as the Appendix.

Special Note for Amiga Users

Fortunately for us at Dr. T's, the Atari ST and the Amiga are similar enough that no significant changes had to be made to the program when we ported it from the ST to the Amiga. Due to some slight differences in the two computer's keyboards, however, some of the keys used for control functions in the program are not available on both computers. In the Amiga version of the program, we have substituted the following keys for keys on the Atari keyboard.

Atari ST	Amiga
UNDO	Right AMIGA key
INSERT	Right ALT key
CLR HOME	Shift-DEL
Numeric (	Numeric - (1000 Only)
Numeric)	Shift-Numeric - (1000 Only)
Numeric *	Numeric . (1000 Only)
Numeric /	Shift-Numeric . (1000 Only)

Edit Windows and Dialog Boxes

When selecting an edit operation or some other function in the KCS, it is often necessary to provide additional information to the program. Two methods are utilized to set the parameters for these operations. **Dialog boxes** are an element of the ST's GEM operating system, and are used to enter data for some functions in the ST version of the program, and **edit windows**, which were specifically designed for the KCS, are used by operations requiring more than a few data entries in the ST version, or for all operations in the Amiga version.

Dialog boxes, which are described in the manual that came with your ST, appear in the center of the screen when certain operations are selected. The box will contain two or more **exit buttons**, and possibly one or more areas for entering numeric data or text, called **data fields**. Clicking on a data field will place the cursor at the end of that field, and the BACKSPACE and ESC keys can be used to clear the data field. When done entering data, click on the appropriate exit button. If one of the exit buttons is heavily outlined, it can also be selected by pressing RETURN.

Some dialog boxes may have **radio buttons** as well, which are used to choose one of several options. These buttons are similar to the buttons on a car radio, because selecting one will turn the previous selection off.

Edit windows are used by most operations which have more than two or three options to select. Some edit windows are quite small, while one, the SET OPTIONS window, occupies the entire screen. Edit windows contain an assortment of radio buttons, data fields, and exit buttons, but look quite different from dialog boxes. The radio buttons are the cyan (blue-green) text areas which describe the various options, and are highlighted when selected. Some buttons are used to turn an option on or off (called toggling), while others are used to select one or another of a set of mutually exclusive choices (such as one of the three clock source options). Whether a button is a toggle switch or a selector switch is usually obvious from context, and is easily determined through experimentation.

Data may be typed into the data fields, or data can be entered using the **arithmetic strip**, which is a row of red arrow and diamond icons at the bottom of the edit window. After clicking on a data field, clicking on different parts of the arithmetic strip will change the value there. Clicking on the leftmost diamond sets the entry to its lowest legal value, the right diamond selects the highest value, and the middle diamond selects the center of that parameter's range. Clicking on the > > or < < symbols increases or decreases the entry by ten units, while > and < change the value by one unit. The functions of each of the icons in the arithmetic strip are duplicated by the M, <, COMMA, L, PERIOD, >, and / keys. The CLR HOME key will clear a data field, *which is not always the same as entering zero.* The cursor control keys can also be used to move from one data field to another.

The exit buttons for the edit windows are the white text at the bottom of the edit window. The RETURN key duplicates OK, and the UNDO key duplicates the CANCEL button.

Hard Disks and Multiple Programs

Hard disks can be extremely useful in a studio or live MIDI system. The KCS can be installed on a hard disk, but the original program disk must be inserted in drive A: on the ST, or any floppy drive on the Amiga, as a "key disk" when the program boots. In addition to the KCS program file, you will need to copy the files DEFAULT.ENV and DEFAULT.VRY to the hard disk.

For Atari ST owners who would like to have more than one program available for use at any time, a new feature which allows this has been added to version 1.6 of the KCS. The Multi Program Environment (MPE) allows you to load up to four additional Dr. T programs into the computer at once, by releasing memory normally used for sequence storage for use by the other programs. Note that the KCS is *not* compatible with other programs which perform this function externally, such as K-Switch. Because of memory limitations when the KCS is running, the only desk accessory you may use with the KCS is CONTROL.ACC, which was supplied with your Atari.

In the Amiga version of the KCS, the Amiga's multitasking features are fully supported. Chapter 4 contains complete details.

Equipment Hookup

Depending on the equipment you have, there can be several ways to connect the various synthesizers, drum machines, sync boxes, etc. Basically you want to connect your recording synth or master keyboard's MIDI out to the computer's MIDI in, then connect the computer's MIDI out to the master synth's MIDI in. If you're using an Atari ST, you can connect your MIDI cables directly to the computer's built-in MIDI ports. If you have an Amiga, you can use any commercial or home-built MIDI interface that connects to the Amiga's serial port. (This includes just about every Amiga MIDI interface on the market, with the notable exception of Roland's MPU 401.) It is considered good practice to plug the MIDI interface into the computer before turning your system on.

If you have more than one synth, you will need to connect any additional synths to the computer using a MIDI thru box, or the MIDI thru jack on your master synthesizer, if present. Assign each instrument to its own MIDI channel, and make sure that data reception is enabled on each instrument. If you want to use a drum machine or other MIDI clock source as a master clock while recording, you will need a MIDI merger to connect the computer's MIDI input to both devices simultaneously.

When connecting your system, there are two common conditions to watch out for that can cause major headaches. The first is a MIDI loop, caused by routing the computer's MIDI out back to its input, either through a MIDI merger or a synth with a built in merge or echo function. The other condition, which occurs only on the Atari ST, is caused by the ST's slightly nonstandard MIDI output jack. While the MIDI spec calls for pins 1 and 3 of a MIDI connector to be left open, the ST uses these pins to provide a thru connection from the ST's MIDI in. Normally, this would not be a problem, but some manufacturers of MIDI cables also violate the MIDI spec and short these two pins to pins 4 and 5, which carry MIDI data. When used with the ST, these cables can cause data to become garbled, so check your cables carefully before using them. Worse yet, some instruments short these pins together at their MIDI inputs, so that even simple 5 conductor MIDI or DIN cables can cause the problem! If seemingly correct MIDI connections result in playback problems, check for these conditions. MIDI connectors are optically coupled, so a wrong connection will at worst result in no data transmission.

Running the ST KCS

To run the Keyboard Controlled Sequencer on the Atari ST, insert the program disk in the disk drive and turn the computer on, or press the computer's reset button. The desktop will appear, with the disk directory enclosed in a window. Double click on the icon labeled KCS16.PRG, and the program will load and run. (Note that future versions of the program may have slightly different file names.) The program will come up on the Track mode record screen.

Running the Amiga KCS

The KCS program disk is a bootable WorkBench disk. After the WorkBench appears, run the program by double clicking on the large monitor-shaped icon, or by typing KCS when in CLI.

Before the program finishes booting, a requestor box will appear, where you may allocate a portion of the Amiga's free memory for use as sequence storage. The amount of memory reserved for the KCS is expressed in events, where an event is the equivalent of a note on/off pair, and is six bytes long. The default is 50% of the Amiga's free memory, but you may select any proportion you want. The trade off here, of course, is that if you allocate all your memory to the KCS, you'll be able to store a maximum number of notes in the sequencer, but you won't have as much memory available for any other programs, such as patch editors. You may want to adjust this slider differently at the start of each session, depending on how much multitasking you plan to do. This setting can't be changed once it's set without re-starting the KCS. After you click on OK, the program's Track mode play/record screen will appear.

Chapter 2

Track Mode Recording Tutorial

The purpose of this tutorial is to familiarize the first time user of the KCS with the program's Track mode play/record screen. The tutorial also provides an introduction to the Song mode edit screen, the set options screen, and to transferring data between the three modes.

If you have a multi-timbral synthesizer system, set it up with a four voice fuzz guitar or similar patch on channel 1, and a two voice dynamic bass on channel 2. Your recording keyboard should be set to play some sort of horn or other contrasting sound on channel 3. If your instrument is not multi-timbral, set its MIDI receive mode to Omni On/Poly.

If your drum machine recognizes MIDI note messages as drum hits, then set its mode to Omni Off/Poly, and its channel to 16. If it has programmable drum key assignments, set them according to the table at the end of Chapter 12; if not, it should work as is. If your drum machine can't be played via MIDI, set it to sync to MIDI clock, and select a plain vanilla 4/4 pattern.

Boot the program as described at the end of Chapter 1, and the Track mode play/record screen will appear. If your system is connected as suggested in Chapter 1, the sequencer is ready to record immediately. (If you are using a master keyboard and a set of expander modules, you will probably need to turn on MIDI merging, by clicking the mouse on the MERGE button in the lower right corner of the screen.)

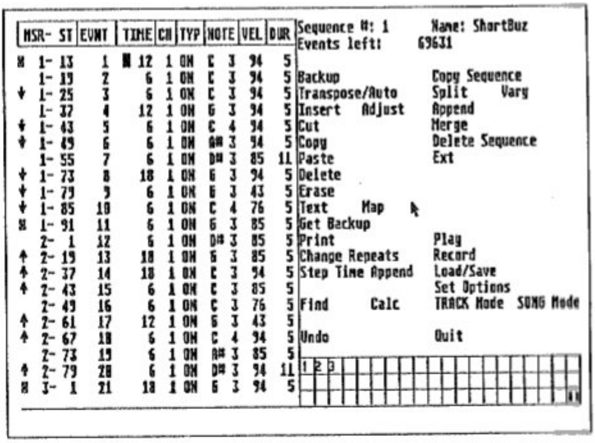
Play a few notes on your recording keyboard, and the sequencer will start to record. The metronome will start to tick, and the MIDI channel of the first MIDI message recorded will be displayed for track 1 in the upper left corner of the screen. Record a few bars of keyboard noodling, then press the F10 key. The sequencer will continue to record to the end of the measure, and then loop back to the beginning of track 1. The material that you just recorded should now play back.

If you were to continue playing on your keyboard, recording would start on track 2, and both tracks would loop at the end of track 1. This process can be repeated for all 48 tracks, in much the same way that drum machines allow continuous overdub recording.

Now click on the EXIT button at the bottom of the screen. The sequencer will stop, and the Track mode edit screen will appear. This screen is used for editing tracks, and for accessing other parts of the program. In this case, we want to load a set of previously recorded tracks from disk, so insert the KCS program disk in drive A and click on LOAD/SAVE, in the second column of text on the right half of the screen.

The LOAD/SAVE dialog box will now appear on the screen. The .ALL button (and the A: button on the Atari) should be highlighted; if not, change these settings by clicking on the appropriate button. Click on the LOAD button, and a file selector box will appear. Click on the name of the file to be loaded (RECORTUT.ALL), followed by OK.

Once the file is loaded, the program will return to the play/record screen, which should now look like this:



```
 MSR- ST EVNT  TIME CH TYP NOTE VEL DUR  Sequence #: 1      Name: ShortBuz
                                         Events left:    69631
M  1- 13    1  ▮ 12  1 ON  C  3  94   5
   1- 19    2     6  1 ON  C  3  94   5  Backup             Copy Sequence
↓  1- 25    3     6  1 ON  C  3  94   5  Transpose/Auto     Split    Vary
   1- 37    4    12  1 ON  G  3  94   5  Insert   Adjust    Append
↓  1- 43    5     6  1 ON  C  4  94   5  Cut                Merge
↓  1- 49    6     6  1 ON  A# 3  94   5  Copy               Delete Sequence
   1- 55    7     6  1 ON  D# 3  85  11  Paste              Ext
↓  1- 73    8    18  1 ON  G  3  94   5  Delete
↓  1- 79    9     6  1 ON  G  3  43   5  Erase
↓  1- 85   10     6  1 ON  C  4  76   5  Text     Map
M  1- 91   11     6  1 ON  G  3  85   5  Get Backup
   2-  1   12     6  1 ON  D# 3  85   5  Print              Play
↑  2- 19   13    18  1 ON  G  3  85   5  Change Repeats     Record
↑  2- 37   14    18  1 ON  C  3  94   5  Step Time Append   Load/Save
↑  2- 43   15     6  1 ON  C  3  85   5                     Set Options
   2- 49   16     6  1 ON  C  3  76   5  Find      Calc     TRACK Mode  SONG Mode
↑  2- 61   17    12  1 ON  G  3  43   5
↑  2- 67   18     6  1 ON  C  4  94   5  Undo               Quit
   2- 73   19     6  1 ON  A# 3  85   5
↑  2- 79   20     6  1 ON  D# 3  94  11  1 2 3
M  3-  1   21    18  1 ON  G  3  94   5
```

The play/record screen is divided into two major sections: the **control panel** at the bottom of the screen, and the **track status area**, at the top. The control panel contains buttons for the most important Track mode recording functions, and there is a set of hidden controls for lesser used functions. The status area shows the status and name of each of the first 36 tracks. A message line at the bottom of the screen displays messages regarding the status of various hidden controls, and other information.

Click the mouse on the PLAY button to start the sequencer. Six of the eight tracks in use will start to play. The RECORD button is still highlighted, which indicates that the sequencer is ready to record. We won't be recording anything for a while, so click on this button to disable recording.

The control panel contains other buttons which correspond to controls on a tape deck. The PLAY, STOP, and PAUSE buttons perform the obvious functions, and the << and >> icons next to the CLOCK display are used to change the sequencer's tempo, or speed. All of these controls are activated by left clicking on them, just as if they were actual physical buttons. Experiment with these controls, then return the sequencer to PLAY status, at a comfortable tempo.

Click the mouse on the display for track 1 in the status area, and the word MUTE will appear on that line, and the track will be silenced. Clicking on the track again, or pressing the 1 key on the computer's typewriter keyboard, will unmute the track.

Note that the MUTE button is highlighted. If MUTE is on, then selecting any track, either with the mouse or by pressing a track key, will mute or unmute that track. The track keys are single keys on the computer keyboard which correspond to one of the 48 tracks, and are listed in the right hand column under TRACK in the status area. Experiment with the MUTE function on the other tracks, using the mouse and the track keys. (You might want to avoid unmuting track 6 at this point, as this track is in a different key than the others.)

After you get a feel for muting tracks, return each track to its original MUTE status (see the screen shot earlier in this chapter) and unmute track 4. This track is a slight variation on track 5, and doesn't contribute anything of interest, yet.

Hold down the SHIFT key and press F1. The MUTE light will go off, and the words "SHIFT 1" will appear on the message line. Click on track 4, and the hi-hat part will be augmented by a slightly delayed version of itself.

Click on track 4 again to increase the delay time. At this setting, it sounds less like an intentional delay and more like slop, so let's shift the track back one step. Press SHIFT and F4, and the message line will change to SHIFT -1. Click on track 4 once, to return it to its slightly delayed position.

MUTE, SHIFT 1, and SHIFT -1 are all part of a set of functions called **track options**. A track option determines what will happen to a track when it is selected with the mouse or its track key. There are over a dozen different track options, but only one can be turned on at any time. Some track options can be selected on the control panel, while others can only be selected from the computer's keyboard. Another important track option which can be accessed from the control panel is the SOLO option. Click on the SOLO button, and experiment with this track option on each track. Select MUTE when you have soloed every track, and they will all return to their original statuses.

Now let's copy these tracks into Open mode sequences, which will be assembled into a song in Song mode. The ALL TRACKS TO SEQ option will copy all unmuted tracks into a specified sequence. By muting various combinations of tracks and copying all tracks to a number of sequences, it's possible to build sections of a song in Track mode. We will use this technique to make a short song from these tracks.

Stop the sequencer, and mute tracks 1, 2, 4, 6, and 8. Press the ! (SHIFT-1) key, and an edit window labeled COPY TO SEQUENCE will appear. This window allows you to specify a sequence number, name, and comments for the sequence. (For the moment, ignore the INCLUDE MUTED TRACKS button.) The sequence number defaults to the lowest empty sequence (in this case, sequence 2), and the comments field will show a list of the unmuted tracks. Click on OK or press RETURN to copy the unmuted tracks (tracks 3, 5, and 7) into sequence 2.

Now, using the method described in the last paragraph, copy the following track combinations into sequences 3 to 8:

Mute tracks 1, 2, 4, and 6, and copy the other tracks into sequence 3.

Mute tracks 1, 4, and 6, and copy the other tracks into sequence 4.

Mute tracks 4 and 6, and copy the other tracks into sequence 5.

Mute track 6 only, and copy the other tracks into sequence 6.

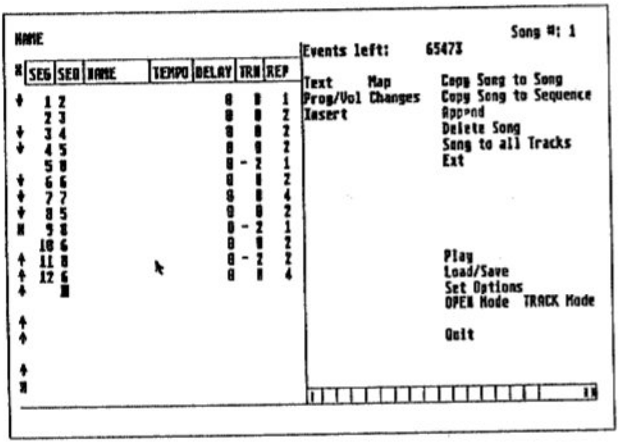
Mute tracks 1 and 6, and copy the other tracks into sequence 7.

Mute tracks 1, 5, and 8, and copy the other tracks into sequence 8.

Now that we've created the parts to our song, we can go to Song mode and chain them into a song. Click on SONG MODE on the Track mode edit screen, and the Song mode edit screen will appear. Songs are created by typing in entries in the **event list**, the large empty area on the left side of the screen. The small square in the upper left corner of the event list is called the **edit cursor**, and determines where data entry and editing occurs.

The number or letter in the column labeled SEQ determines which sequence will play. Type 2 on the computer keyboard, and note the changes on the screen. The white box shows the valid area for cursor placement, and the columns to the right of the SEQ column are used to enter tempo, transposition, and other information. Use the cursor control keys to move the cursor to the right end of the box, and type 2 under REP, followed by RETURN.

In the same way, type in the numbers shown in the following screen shot. Use the UNDO key to erase mistakes before pressing RETURN, or use the mouse to place the edit cursor over your mistake and type in the correct data, on a previously entered line. The NAME column will remain blank as you enter each sequence, though if we had named the sequences when creating them, the names would appear at this point.


NAME
Song #: 1
Events left: 65473
Text
Map
Prog/Vol Changes
Insert
Copy Song to Song
Copy Song to Sequence
App=nd
Delete Song
Song to all Tracks
Ext
Play
Load/Save
Set Options
OPEN Mode
TRACK Mode
Quit

SEG	SEQ	NAME	TEMPO	DELAY	TRN	REP
1	2			0	0	1
2	3			0	0	2
3	4			0	0	2
4	5			0	0	2
5	0			0	-2	1
6	6			0	0	2
7	7			0	0	4
8	5			0	0	2
9	8			0	-2	1
10	6			0	0	2
11	8			0	-2	2
12	6			0	0	4

The numbers in the SEQ column indicate which sequence will be played at that point in the song. TRN specifies a pitch transposition for the sequence, in half steps, and REP shows how many times the sequence will repeat. Once the song is complete, it can be played from the Song mode play screen; but since this is a Track mode tutorial, we will use Song mode's SONG TO ALL TRACKS option, which will erase all tracks and create a new set of tracks that are the equivalent if the song. This will be much longer than the original tracks, and will allow us to overdub tracks that are the length of the entire song.

Before copying the song to all tracks, there is one minor adjustment to the sequencer's operating parameters that must be made. Click on SET OPTIONS, and a large edit window will appear. A number of different parameters can be set from this screen, but for the moment, we are only interested in one, DRUM CHANNEL, on the right side of the screen. The space to the right of this button displays the drum channel. Click on this space, then click on the rightmost diamond in the arithmetic strip at the bottom of the window, to set the drum channel to 16. Press RETURN or click on OK to exit the edit window. Setting a channel to drum channel status tells the sequencer not to transpose that channel, which would change each drum to another drum if applied to a MIDI drum part. Since sequence 8 is transposed each time it's played in this song, the drum channel must be set to 16 before copying the song to all tracks, to protect the drum parts on channel 16.

Click on SONG TO ALL TRACKS, and a dialog box will appear to confirm your choice. After clicking on OK, the program will take a few seconds to create the new tracks. When the WORKING message disappears from the message line, click on TRACK MODE.

When the Track mode play/record screen appears, note that the eight original tracks have been compressed into four tracks - one for each channel used, and a "conductor" track (track 1) which sets the length of all tracks. Click on the PLAY button, and the song will start to play.

With the song "stretched out" into four long tracks, it is now possible to overdub tracks that are the length of the entire song. This allows you to add parts that are not locked into the repetitious patterns created by the original tracks, such as lead lines and drum fills.

The exact set up for recording tracks will vary depending on the keyboard/sound generator arrangement you are using. For the rest of this tutorial, we will assume that your recording keyboard is a single channel synthesizer such as a DX7 or a Mirage. If you are using some other arrangement see the sections on

MIDI MERGE, ECHO, and Local Control Off in chapters 6 and 12, as well as your owner's manuals, for information on configuring your system.

Before starting to record, click on the CNTRLRS button. This enables the recording of MIDI controller information such as pitch bend, modulation wheel, and sustain pedal movements. Play along with the sequencer until you get an idea of what you'd like to record, then click on RECORD, and play your part.

Chances are, the first track that you record will not be to your liking. In this case, click on RE-RECORD; the track you are recording will be erased, the sequencer will stop, and you can start over. Once you've recorded a good take, you will be ready to record another track in the same way.

By now, you should have a good idea of the basic technique of Track mode recording on the KCS. The Track mode play/record screen has many other features which have not been discussed here. At this point, you might want to record a short piece of your own, referring to Chapter 6 for more detailed information on the recording process; or continue with the Open mode editing tutorial, for a look at how the sequencer stores and manipulates musical data.

Chapter 3

Open Mode Editing Tutorial

The purpose of this tutorial is to familiarize the first time user of the KCS with the program's Open and Track mode edit screens. The tutorial also provides introductions to the program's representations of various types of musical events, and to creating and editing control sequences. The "raw material" for the editing tutorial consists of three previously recorded sequences, which are to be loaded from disk.

If you have a multi-timbral synthesizer system, set it up with a buzzy clav voice on channel 1, a bass on channel 2, and some type of reed or fluid lead synth sound on channel 3. If your synth isn't multi-timbral, set its MIDI receive mode to Omni On/Poly. If you have a drum machine, set it to synchronize to MIDI clock, disable the reception of MIDI channel messages, and select a simple 4/4 pattern.

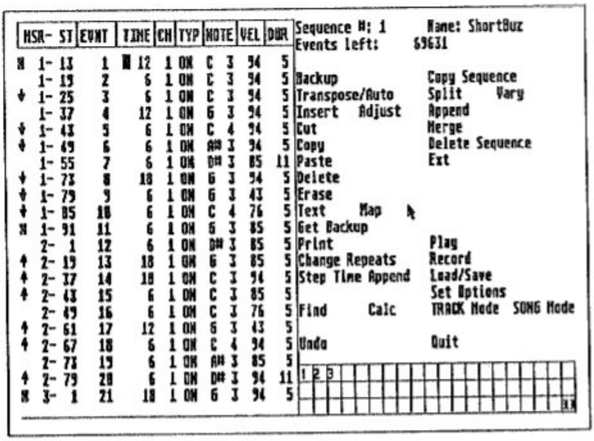
Now boot the program as described at the end of Chapter 1, and you will see the Track mode record screen. Since we will be editing Open mode sequences, the first step is to move to the Open mode edit screen. Click on the EXIT button in the lower left part of the screen, and the Track mode edit screen will appear.

The Track mode edit screen is very similar to the Open mode edit screen, but only tracks can be edited in Track mode, not sequences. On the right side of the screen is a list of editing options. Click on the OPEN MODE option, in the lower right corner, and the Open mode edit screen will appear.

Now the sequences to be edited must be loaded in from the disk. Place your program disk in the disk drive, and click on the LOAD/SAVE option on the right half of the screen. A dialog box will appear, and will ask you for the file type you wish to access, the drive to use, and what action to perform. Confirm that the sequence type selected is .ALL and that the A: drive is selected if you're using an Atari. If not, change these selections by clicking on the appropriate box. Click on LOAD, and a file selection box will appear.

Click on the name of the file to be loaded (EDITTUTR.ALL), and click on OK.

Once the file is loaded, the program will return to the edit screen, which should now look like this:



Sequence #: 1 Name: ShortBuz
Events left: 69631

	MSR- ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
N	1- 13	1	█ 12	1	ON	C 3	94	5
	1- 19	2	6	1	ON	C 3	94	5
↓	1- 25	3	6	1	ON	C 3	94	5
	1- 37	4	12	1	ON	G 3	94	5
↓	1- 43	5	6	1	ON	C 4	94	5
↓	1- 49	6	6	1	ON	A# 3	94	5
	1- 55	7	6	1	ON	D# 3	85	11
↓	1- 73	8	18	1	ON	G 3	94	5
↓	1- 79	9	6	1	ON	G 3	43	5
↓	1- 85	10	6	1	ON	C 4	76	5
N	1- 91	11	6	1	ON	G 3	85	5
	2- 1	12	6	1	ON	D# 3	85	5
↑	2- 19	13	18	1	ON	G 3	85	5
↑	2- 37	14	18	1	ON	C 3	94	5
↑	2- 43	15	6	1	ON	C 3	85	5
	2- 49	16	6	1	ON	C 3	76	5
↑	2- 61	17	12	1	ON	G 3	43	5
↑	2- 67	18	6	1	ON	C 4	94	5
	2- 73	19	6	1	ON	A# 3	85	5
↑	2- 79	20	6	1	ON	D# 3	94	11
N	3- 1	21	18	1	ON	G 3	94	5

Backup
Transpose/Auto
Insert
Adjust
Cut
Copy
Paste
Delete
Erase
Text
Map
Get Backup
Print
Change Repeats
Step Time Append
Find
Calc
Undo
Copy Sequence
Split
Vary
Append
Merge
Delete Sequence
Ext
Play
Record
Load/Save
Set Options
TRACK Mode
SONG Mode
Quit
1
2
3

The edit screen is divided into two major sections: the **edit options** area on the right side of the screen, and the **event list**, on the left half of the screen. The event list displays the actual data which makes up the sequence, and the edit options are used to select editing operations, or to move to other parts of the program. There is also a **message line** at the bottom of the screen, which displays information and prompts when an edit option is selected, and a set of **select boxes** below the edit options, for moving to another sequence.

The **edit cursor**, the small solid square in the upper left corner of the event list, is used to select an event for editing, or to set the beginning or end of a range of events. It can be moved to any point in the event list by clicking on the new position, or it can be moved with the cursor control keys. Practice moving the cursor around the screen with both the mouse and the cursor control keys.

The edit screen can only display 21 events at a time; other parts of the event list can be accessed by scrolling through the list with the red **scroll arrows**, located on the left edge of the event list. Clicking on any of the top three sets of arrows will move the display window up the event list, and clicking on the lower sets moves the window down the list. Clicking on the **scroll diamonds** above or below the scroll arrows will move the window to the top or bottom of the event list, and clicking on the middle diamond will cause continuous scrolling. Practice scrolling through the event list with these controls, then return to the top of the list.

Before editing sequence 1, we want to play it through a few times to hear what it sounds like. Double click the right mouse button, and the Open mode play screen will appear. Press the 1 key on the typewriter keyboard, and sequence 1 should start playing on MIDI channel 1. After listening for a bit, return to the edit screen by pressing F1.

Sequence 1 sounds interesting, but is too repetitive, and is out of sync with the drum machine and metronome. To correct these problems, we will adjust the timing of the sequence, shorten it, and make a few changes to the second repetition of the sequence.

Before doing any editing on the sequence, it's a good idea to make a backup copy. Click on BACKUP, and a confirmation message will appear in the message line. Clicking on GET BACKUP will swap the backup and the edited sequence, for quick comparisons. After you're sure you've done an editing operation correctly, make a new backup so that you won't have to redo the whole tutorial if you accidentally mangle the sequence.

The timing of the sequence is controlled by the data in the TIME field, which is the third column in the event list. Each entry in the TIME field represents the number of clock steps which go by before the remainder of that event occurs. One quarter note equals 24 clock steps, so a TIME value of 12 means that an eighth note's worth of time goes by before the first note in this sequence plays; in other words, this sequence starts on an offbeat, namely the second half of the first beat of the measure. This is why the sequence doesn't sync properly with the metronome and drum machine. This can be easily fixed by changing the first TIME value in the list to zero.

Place the edit cursor over the first digit of the first value in the TIME field, type a space, and look at the screen. The white box which now outlines the first event indicates the data that can be edited. The CURSOR LEFT and CURSOR RIGHT keys, as well as the TAB and SHIFT-TAB keys, can be used to move the edit cursor within the box; experiment with these keys a bit, then place the cursor over the 2 in the TIME field, type 0, and press RETURN (not ENTER).

When RETURN is pressed, all the entries in the MSR-ST field will change. This field marks the location of each event in measures and clock steps. Note that the MSR-ST field now reads 1-1 for the first event, which means that the first note now occurs on the first step of measure one.

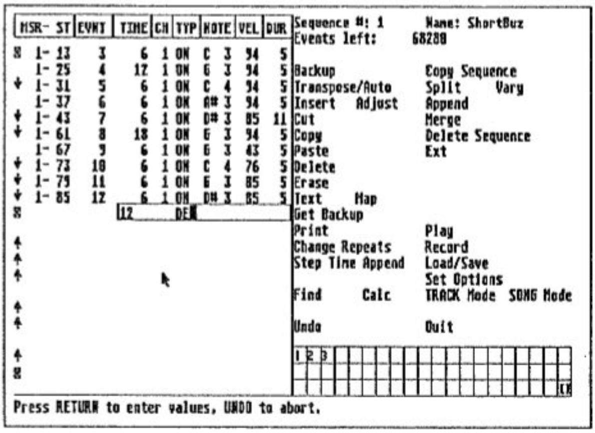
Since the essential theme of this sequence repeats every measure, we can delete all but the first measure of the sequence. The first event of the second measure is event 13; the event number is listed in the EVNT field. Click on event 13, then while holding the left mouse button down, move the mouse pointer all the way down to the area between the end of the event list and the message line. The list will scroll down when the pointer moves below the event list; when the highlight reaches the last event (event 43) in the sequence, release the mouse button. The highlighted region has now been selected for editing. (You may need to "jiggle" the mouse a bit at the end of the event list, to highlight event 43.)

The highlighted portion of the sequence can be played by clicking the right mouse button. Do this now, and note that the measure/step display and a message appear at the bottom of the screen.

Now click on DELETE in the edit options area. A dialog box will ask for the range of notes to be deleted, which defaults to the range that we just selected. To delete the selected range, click on OK. Clicking on UNDO at this point will swap the sequence with a backup copy that was automatically created as part of the DELETE operation. Click on UNDO again to retrieve the edited version.

Return to the Open mode play screen by double clicking the right mouse button, and press 1 on the typewriter keyboard. The sequence starts okay, but loses sync at the start of the first repetition; something is obviously not right. Press F1 to return to the edit screen, and look at the data in the MSR-ST field. The sequence ends on measure 1, step 85, which makes it 84 steps long; but a full measure of 4/4 time at 24 steps per quarter note is 96 steps. The sequence must be extended by 12 steps if it is to synchronize properly with the drum machine.

To add an event to the end of the sequence, place the cursor in the TIME field immediately below the last event in the list, and enter 12. Move over to the TYP field and type DE. The screen should now look like this:



MSR- ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 13	3	6	1	ON	C 3	94	5
1- 25	4	12	1	ON	G 3	94	5
1- 31	5	6	1	ON	C 4	94	5
1- 37	6	6	1	ON	A# 3	94	5
1- 43	7	6	1	ON	D# 3	85	11
1- 61	8	18	1	ON	G 3	94	5
1- 67	9	6	1	ON	G 3	43	5
1- 73	10	6	1	ON	C 4	76	5
1- 79	11	6	1	ON	G 3	85	5
1- 85	12	6	1	ON	D# 3	85	5
		12		DE			

Sequence #: 1 Name: ShortBuz
Events left: 68288

Press RETURN to enter values, UNDO to abort.

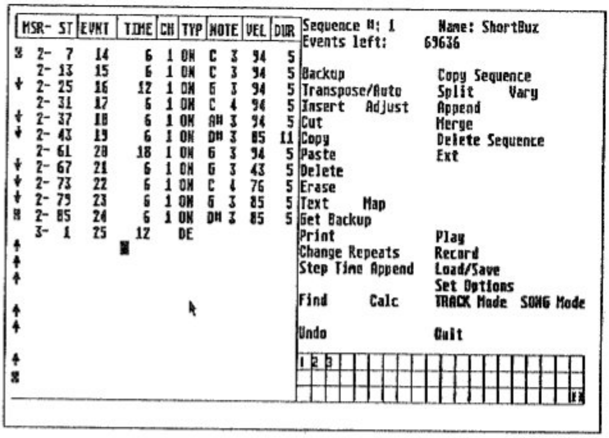
Backup
Copy Sequence
Transpose/Auto
Split
Vary
Insert
Adjust
Append
Cut
Merge
Copy
Delete Sequence
Paste
Ext
Delete
Erase
Text
Map
Get Backup
Print
Play
Change Repeats
Record
Step Time Append
Load/Save
Set Options
Find
Calc
TRACK Mode
SONG Mode
Undo
Quit
1
2
3

The data in the TYP field indicates the event type. All the events up to this point have been ON events, which represent note on and off messages. ON events make up the majority of most sequences. The DE event is a "deleted event", a dummy event in which nothing occurs except the passage of time. When used at the end of a sequence, it sets a time delay between the occurrence of the previous event, and the start of the next sequence. Press RETURN, go to the play screen, and play sequence 1. Everything should sync properly now.

Upon listening to the sequence, it seems that it might make a bit more musical sense to double its length and make a slight change to the second half. We'll do this by first copying part of the sequence into the **paste buffer**, and then pasting it at the end of the original sequence.

Since there is no need to duplicate the DE event, we only need to copy events 1 to 12 into the paste buffer. Place the edit cursor on event 12, and highlight the events from 1 to 12 by holding the left mouse button down and moving the mouse pointer to event 1. (This is known as "dragging" the mouse.) Click on COPY, and an edit window will appear on the screen. The default parameters will work for this operation, so click on OK. These events are now stored in the paste buffer.

Move the edit cursor to event 13, and click on PASTE. A rather complex edit window will appear; for the moment, just confirm that INSERT is selected in the upper left corner, and enter 12 for FIRST EVENT TIME. This is to make up for the DE event and its associated TIME value that weren't copied. Click on OK, and move to the end of the event list by clicking on the bottom scroll diamond. The screen should now look like this:



```
MSR- ST EVNT  TIME CH TYP NOTE VEL DUR
   2-  7  14     6  1 ON  C  3  94   5
   2- 13  15     6  1 ON  C  3  94   5
   2- 25  16    12  1 ON  G  3  94   5
   2- 31  17     6  1 ON  C  4  94   5
   2- 37  18     6  1 ON  A# 3  94   5
   2- 43  19     6  1 ON  D# 3  85  11
   2- 61  20    18  1 ON  G  3  94   5
   2- 67  21     6  1 ON  G  3  43   5
   2- 73  22     6  1 ON  C  4  76   5
   2- 79  23     6  1 ON  G  3  85   5
   2- 85  24     6  1 ON  D# 3  85   5
   3-  1  25    12    DE

Sequence #: 1        Name: ShortBuz
Events left:     69636
```

Backup
Transpose/Auto
Insert
Adjust
Cut
Copy
Paste
Delete
Erase
Text
Map
Get Backup
Print
Change Repeats
Step Time Append
Find
Calc
Undo
Copy Sequence
Split
Vary
Append
Merge
Delete Sequence
Ext
Play
Record
Load/Save
Set Options
TRACK Mode
SONG Mode
Quit
1
2
3

If your sequence doesn't end with a DE event on MSR-ST 3-1, retrieve your backup copy and go through the cut and paste procedure again.

The last step in editing sequence 1 is to make a slight change in the second measure by erasing the last note in the sequence. Place the edit cursor on event 24, and click on ERASE. When the dialog box appears, click on OK to erase event 24. ERASE is similar to erasing a small section of a tape recording, and doesn't affect the timing of the sequence, while DELETE is more like cutting out a piece of the tape, since the sequence is shortened when events are deleted.

Now double click the right mouse button to go to the Open mode play screen, and start sequence 1. While the sequence is running, press the DELETE key; the word ALIGN will appear on the screen. Watch the measure-step display and, while the measure is an even number, press 2 on the typewriter keyboard. This will start sequence 2 at the start of the next measure. This simple three note bass line fits with sequence 1, but the timing is a bit rough.

Return to the edit screen and move to sequence 2 by clicking on the box labeled 2 at the bottom of the right part of the screen. Note that while the TIME values in sequence 1 were all multiples of six, this is not true for sequence 2. This can be fixed with the AUTO-CORRECT option.

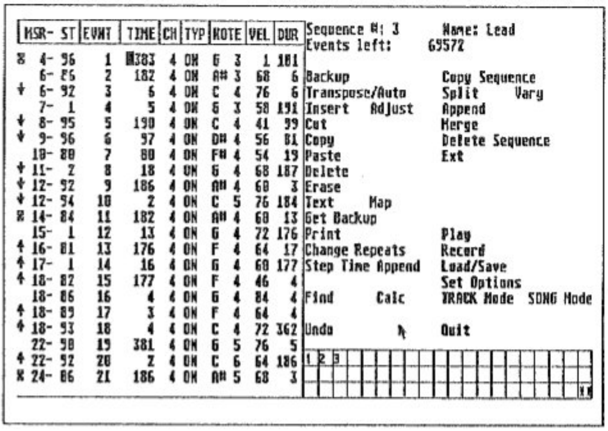
Click on TRANSPOSE/AUTO in the edit options area, and an edit window will appear. This is where most of the data manipulation operations are done. Click on AUTO-CORRECT, and confirm that 6 is entered in the space next to AUTO-CORRECT. When this is done, click on OK, at the bottom of the edit window. The sequence is now auto-corrected; the four values under TIME should be 0, 192, 6, and 186.

Now let's return to the play screen and cue sequences 1 and 2 to start together. First press the DELETE key to align the sequences, and then ESC to pause the sequencer. The word PAUSE will appear above ALIGN; press 1 and 2 to select these sequences, and press ESC a second time to turn off PAUSE and start the sequencer. After listening to this for a bit, wait for an even numbered measure and press 3 on the typewriter keyboard to start sequence 3. This lead line was recorded using quite a bit of mod wheel and foot pedal motion, perhaps too much; but the notes themselves are okay. The best thing to do is probably to strip the controller data from the note data, and to re-record the controllers at a later time.

Return to the edit screen by pressing F1. Sequence 3 looks a little different from the earlier sequences because of the mod wheel and foot pedal data it contains. The CC events represent data from these and other continuous controllers. The value under NOTE is the MIDI controller number for that event (1 for mod wheel, 4 for foot pedal), and that under VEL is the value of that controller. Scroll through the sequence, and note two facts: first, that continuous controllers use up much more memory than notes do, and second, that the many CC events make it difficult to view and edit the ON events.

CC events can be deleted from a sequence using the ERASE CONTROLLERS option, which is reached from the TRANSPOSE/AUTO edit window. Click on TRANSPOSE/AUTO, followed by ERASE

CONTROLLERS and OK. Sequence 3 should now look like this:



MSR- ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
↕ 4- 96	1	383	4	ON	G 3	1	181
6- 86	2	182	4	ON	A# 3	68	6
↓ 6- 92	3	6	4	ON	C 4	76	6
7- 1	4	5	4	ON	G 3	58	191
↓ 8- 95	5	190	4	ON	C 4	41	99
↓ 9- 96	6	97	4	ON	D# 4	56	81
10- 80	7	80	4	ON	F# 4	54	19
↓ 11- 2	8	18	4	ON	G 4	68	187
↓ 12- 92	9	186	4	ON	A# 4	60	3
↓ 12- 94	10	2	4	ON	C 5	76	184
↕ 14- 84	11	182	4	ON	A# 4	68	13
15- 1	12	13	4	ON	G 4	72	176
↑ 16- 81	13	176	4	ON	F 4	64	17
↑ 17- 1	14	16	4	ON	G 4	60	177
↑ 18- 82	15	177	4	ON	F 4	46	4
18- 86	16	4	4	ON	G 4	84	4
↑ 18- 89	17	3	4	ON	F 4	64	4
↑ 18- 93	18	4	4	ON	C 4	72	362
22- 90	19	381	4	ON	G 5	76	5
↑ 22- 92	20	2	4	ON	C 6	64	186
↕ 24- 86	21	186	4	ON	A# 5	68	3

Sequence #: 3 Name: Lead
Events left: 69572

Backup
Transpose/Auto
Insert Adjust
Cut
Copy
Paste
Delete
Erase
Text Map
Get Backup
Print
Change Repeats
Step Time Append
Find Calc
Undo
Copy Sequence
Split Vary
Append
Merge
Delete Sequence
Ext
Play
Record
Load/Save
Set Options
TRACK Mode SONG Mode
Quit
1
2
3
**

The note data from the lead synth part is much easier to read with the controller data eliminated, and can be edited more easily as well.

Now that we've got all three parts edited, let's combine them into a short song. This is done using **primary sequence start** events in a separate Open mode sequence known as a **control sequence**. Primary sequence start events are represented in the event list by the number or letter of the sequence, and the NOTE, VEL, and DUR fields are used to indicate the pitch transposition, velocity transposition, and number of repeats for that sequence.

We will create the control sequence in sequence A, which doesn't exist yet, and therefore is not shown in the select boxes at the bottom of the edit options area. To get to a sequence that isn't shown here, click on the ** symbol in the last select box, and enter A in response to the prompt. Place the cursor on the single DE event, and press the INSERT key. When the white box appears, type in the following data, pressing RETURN after each line and moving the edit cursor up or down with the cursor control keys after the last line.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		1	0	-20	2W
1-	1	2	0		1	0	0	4
1-	1	3	0		2	0	0	2W
1-	1	4	0		3	0	0	1
1-	1	5	0		1	0	0	24
1-	1	6	0		2	0	0	12W

The W's in the duration fields are WAIT flags, which cause playback of the control sequence to wait until the sequence in that line is done playing. In this example, starting sequence A will start sequence 1 immediately; when sequence A reaches the W at the end of the line, sequence A will pause until sequence 1 finishes its two repetitions. After waiting for the TIME value of zero steps, sequences 1 and 2 will start and run for 2 repetitions of sequence 2; after which sequences 1, 2 and 3 will start together. The -20 in the VEL field for event 1 causes sequence 1 to play its note velocities 20 units lower than normal.

This sequence can be played from the Open mode play screen just like the others were, but there is another method for playing sequences that is more convenient when editing. Place the edit cursor on the first event, and click the right mouse button; the sequence will play from the first event. Clicking the left mouse button will stop the sequence. The sequence can be played from any event by placing the edit cursor on that line and right clicking, which makes it easy to listen to just part of the sequence.

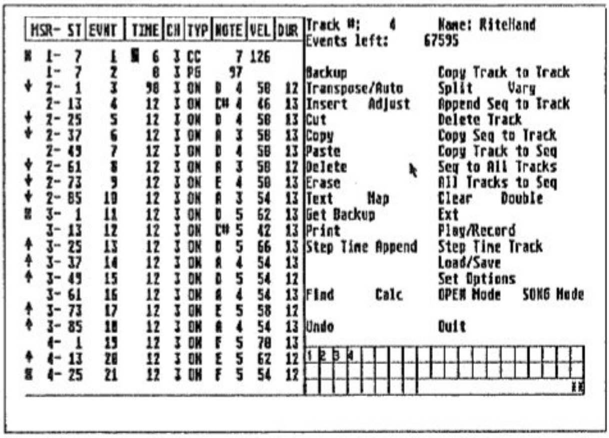
This tutorial has by no means covered the full range of edit options available on the KCS, but you should now be familiar enough with the sequencer's operation to get started making some music. More details on editing can be found in Chapter 4.

Chapter 4

Open and Track Mode Editing

The Open mode and Track mode edit screens let you make individual or global changes to pitch, duration, velocity, MIDI channel, and timing for all notes in a sequence or track. Notes and other MIDI events can be edited individually, copied to another point in the same sequence or track, or copied to another sequence or track. New events can be typed in from the computer keyboard, or can be entered in step time using a MIDI keyboard in conjunction with the computer's keyboard. In many ways, the KCS's edit screens act as a word processor designed for music. In addition, the edit screens are used to access the computer's disk drive(s), to set the sequencer's operating options, and to move from one mode to the next.

The edit screens for Open and Track modes are quite similar, though each mode has a few commands not shared by the other mode.



```
 MSR- ST EVNT  TIME CH TYP NOTE VEL DUR   Track #:    4      Name: RiteHand
                                          Events left:     67595
■ 1-  7    1 ■   6  3 CC      7 126
  1-  7    2     8  3 PG     97
↓ 2-  1    3    98  3 ON  D  4  58  12
  2- 13    4    12  3 ON  C# 4  46  13
↓ 2- 25    5    12  3 ON  D  4  58  13
↓ 2- 37    6    12  3 ON  A  3  58  13
  2- 49    7    12  3 ON  D  4  58  13
↓ 2- 61    8    12  3 ON  A  3  58  12
↓ 2- 73    9    12  3 ON  E  4  58  13
↓ 2- 85   10    12  3 ON  A  3  54  13
■ 3-  1   11    12  3 ON  D  5  62  13
  3- 13   12    12  3 ON  C# 5  42  13
↑ 3- 25   13    12  3 ON  D  5  66  13
↑ 3- 37   14    12  3 ON  A  4  54  13
↑ 3- 49   15    12  3 ON  D  5  54  12
  3- 61   16    12  3 ON  A  4  54  13
↑ 3- 73   17    12  3 ON  E  5  58  12
↑ 3- 85   18    12  3 ON  A  4  54  13
  4-  1   19    12  3 ON  F  5  78  13
↑ 4- 13   20    12  3 ON  E  5  62  12
■ 4- 25   21    12  3 ON  F  5  54  12
```

Backup
Transpose/Auto
Insert
Adjust
Cut
Copy
Paste
Delete
Erase
Text
Map
Get Backup
Print
Step Time Append
Find
Calc
Undo
Copy Track to Track
Split
Vary
Append Seq to Track
Delete Track
Copy Seq to Track
Copy Track to Seq
Seq to All Tracks
All Tracks to Seq
Clear
Double
Ext
Play/Record
Step Time Track
Load/Save
Set Options
OPEN Mode
SONG Mode
Quit
1
2
3
4

The edit screen is divided into four sections: the **event list** on the left half of the screen, the **edit options** on the right side, the **message line** at the bottom of the screen, and the **select boxes**, below the edit options. The event list displays up to 21 events (notes, program changes, control changes, etc.) of the currently selected sequence or track, and is where the actual editing takes place. The edit options section is used to select which editing operation is to be performed, and also contains options for selecting a new track or sequence, changing modes, setting the sequencer's operating parameters, and exiting the program. The message line is used to display messages about certain editing options, and to ask for more information about other options. The select boxes are used to select a different sequence or track.

There are also two cursors on the edit screen: the mouse pointer, and the **edit cursor**. The mouse pointer indicates the current position of the mouse, as in all ST and Amiga programs, while the edit cursor indicates the point at which editing will take place, or from which playback will begin if the right mouse button is clicked.

The Event List

The event list consists of five editable data fields, two fields whose contents are determined by the program, and a set of icons for scrolling though the list. Here is a description of each of the fields:

MSR-ST: The measure and step at which the event occurs. For example, 2-13 means the thirteenth step of measure two. This is computed by the program and cannot be changed.

EVNT: The number of the event. EVNT is used to specify a range of events in the sequence or track when you are using the various edit options. This is also computed by the program and cannot be changed.

TIME: The time at which this event occurs in relation to the start of the previous event. Time is measured in steps of the internal or MIDI clock. Changing the current value will move this event and all subsequent events forward or backward in time (with the exception of entries followed by the ENTER key, as described later in this chapter). The range of permissible values is 0 to 65535.

CH: The MIDI channel of the event. The CH field is not used for non-MIDI events, or for MIDI events which don't carry channel information. Channel numbers must be between 1 and 16.

TYP: The event type. The KCS uses over twenty different event types, which are explained later in this chapter. The most commonly used event type is the note on event, which has a TYP value of ON. The meaning of the data in the next three fields is dependent on the data in the TYP field, so the names of these fields are only meaningful for a note on or note off event.

NOTE: The note value and octave, where the lowest note on a five octave keyboard is C2. Since computer keyboards don't contain flat symbols, flats are specified as the corresponding sharps (B flat 3 becomes A#3, for instance.) The range of valid MIDI notes in the KCS is C-1 to G9, though some other companies, most notably Yamaha, number MIDI notes from C-2 to G8.

VEL: Key velocity. The permissible range is 0 - 127.

DUR: The duration of the note, or how long the key was actually held down. The range for duration is 1 - 999. A duration of 0 produces a note on with no corresponding note off, which is useful for creating notes with durations greater than 999 clock steps.

Scrolling through the event list is done by clicking the mouse pointer on one of the diamonds or arrows to the left of the event list. Clicking on the top diamond moves the cursor to the first event in the event list, clicking on the bottom diamond moves to the end of the list, and clicking on the middle diamond causes continuous scrolling from the edit cursor's current position. When the middle diamond is used, pressing the CONTROL key will cause scrolling to pause until the CONTROL key is pressed again, while pressing ESC causes scrolling to terminate.

The scroll arrows provide another method for scrolling through the event list. Clicking on one of the triple arrows moves the event list forward or backward by eighteen events, the double arrows move the list by nine events, and the single arrows move the list by one event. Holding the left mouse button down while the mouse pointer is positioned over an arrow causes continuous scrolling.

The edit cursor may be moved to any point in the event list using the cursor keys, or by clicking the mouse on the appropriate point in the list. Note that the edit cursor can not be moved into either of the noneditable fields (MSR-ST and EVNT), so clicking the mouse on these fields has no effect.

Select Boxes and Edit Options

The select boxes, which are the small numbered boxes stacked at the bottom of the right half of the screen, are used to select a new sequence or track for editing. In Track mode, each of the 48 tracks has its own box. Tracks which contain data are shown as boxes with a number in them, while empty tracks are represented by an empty box. Clicking on a box will select that track for editing, or clicking on ** will allow you to type the track number.

Two sequences or tracks can also be swapped using the select boxes. Holding the left or right SHIFT key down when clicking on a select box will exchange that track or sequence with the currently selected track or sequence.

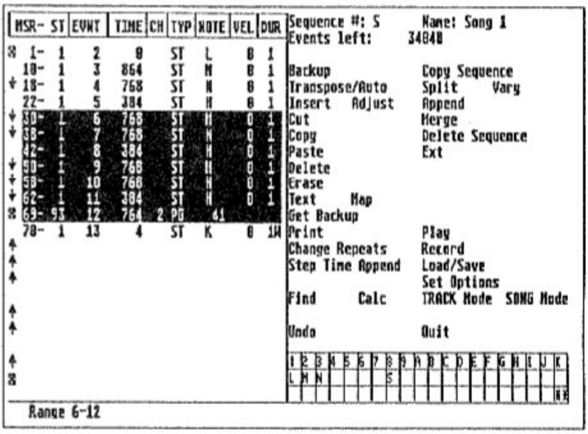
In Open mode, only the first 33 primary sequences (A - X) and the first 26 of the secondary sequences (00 - 25) can be accessed with the select boxes. Sequences Y and Z are reserved for use by the program and can't be directly edited. Secondary sequences above 25 must be selected by clicking on ** and typing the sequence number.

The edit options are displayed on the right half of the screen. An option is selected by clicking on its name. Depending on the option chosen, a message, edit window, or dialog box may appear. The specific details on each option are explained later in this chapter.

While most of the edit options are identical in both Track and Open modes, there are slight differences in some cases, and some options appear only in one mode or the other. If this is the case, it will be noted in the section on that option.

Selecting a Range for Editing

Most of the edit options will work on a range of events, as well as a single event. The range can be entered in the dialog box or edit window for that option, or a range may be selected with the mouse. To select a range of events for editing, place the edit cursor at the top or bottom of the range, and while holding the left mouse button down, move the edit cursor to the other end of the range. (This is called "dragging" the edit cursor.) The selected range will be highlighted, as shown below.



```
 MSR- ST EVNT  TIME CH TYP NOTE VEL DUR
   1-  1    2     0    ST   L     0  1
  10-  1    3   864    ST   M     0  1
  18-  1    4   768    ST   N     0  1
  22-  1    5   384    ST   H     0  1
  30-  1    6   768    ST   H     0  1
  38-  1    7   768    ST   N     0  1
  42-  1    8   384    ST   H     0  1
  50-  1    9   768    ST   H     0  1
  58-  1   10   768    ST   H     0  1
  62-  1   11   384    ST   H     0  1
  69- 93   12   764  2 PG     41
  70-  1   13     4    ST   K     0 1W
 Range 6-12
```

```
Sequence #: 5      Name: Song 1
Events left:    34048
```

Backup
Transpose/Auto
Insert
Adjust
Cut
Copy
Paste
Delete
Erase
Text
Map
Get Backup
Print
Change Repeats
Step Time Append
Find
Calc
Undo
Copy Sequence
Split
Vary
Append
Merge
Delete Sequence
Ext
Play
Record
Load/Save
Set Options
TRACK Mode
SONG Mode
Quit
1 2 3 4 5 6 7 8 9 A B C D E F G H I J K
L M N 5
KK

You can drag the cursor beyond the bottom of the screen, and the event list will automatically scroll to the new position. The selected range can be played by clicking the right mouse button.

After a range is selected, a new range may be selected in the same way, and the active select range can be toggled between the two by pressing the ALTERNATE key. If a range extends over more than a single screen, you can move from one end of the range to the other by pressing the CONTROL key.

When a range is selected, the first and last event numbers of that range will be displayed on the message line.

Playing the Sequence or Track from the Edit Screen

In addition to the PLAY edit option found on all three edit screens, the KCS allows you to play part or all of the sequence or track being edited using the mouse buttons. On both the Track mode and Open mode edit screens, a single right click on the mouse will play the selected sequence or track, starting at the location of the edit cursor. If a range has been highlighted, a single right click will play only the highlighted events. Note that this occurs even if the selected range has been scrolled off the screen. If a single right click does not produce the expected results, check the message line to confirm that the proper range is selected.

A double right mouse click will transfer you directly to the Track or Open mode play screen. If the program seems to have a problem distinguishing single and double clicks, you can also move to the play screen by holding down the SHIFT button while right clicking. The Amiga may have problems with double clicks if you click too fast; try clicking a little slower in this case.

In Open mode, pressing the left and right mouse buttons simultaneously will play the currently selected cue. In Track mode, all unmuted tracks will be played starting at the cue point, or if a range is selected, that range will be played for the selected track, as well as all other unmuted tracks.

To stop the sequencer when playing from the edit screen, click the left mouse button. Holding the SHIFT key when doing this will place the last event played about 2/3 of the way down the edit list, which is handy when you need to locate a specific event by ear.

When playing from the edit screen, the internal clock is always used, even if MIDI or MIDI W SONG POINTER is selected as the clock source on the SET OPTIONS screen.

Editing or Entering a Single Event

To change a value in the event list, move the edit cursor to the location of the value, and type in the new value. When you start to type, a white box called the **edit box** will outline the fields you may edit. You can use the cursor control and BACKSPACE keys to move over characters in the field and the SPACE bar to clear them out. The TAB key will move the cursor to the next field, and SHIFT-TAB will move the cursor back one field. The cursor can also be moved to any point within the edit box by clicking the mouse on that point. When you're done entering data, press RETURN to enter the data, or UNDO to cancel the change. Clicking the mouse outside the edit box has the same effect as pressing RETURN.

Since the program expects to see only certain types of data in each field, (numbers from 1 to 16 in the CH field, for example), entering invalid data in a field will cause your entry to be misinterpreted or ignored. You must enter data that is appropriate for the type of event that you are editing.

To add notes to the end of a sequence or track, place the edit cursor in the TIME field on the first line after the end of the sequence or track, and enter the data as described above.

In most cases, the RETURN and ENTER keys perform the same function in the KCS, but there is one important difference between these two keys when editing events. If the TIME value for an event has been changed and the ENTER key is pressed instead of RETURN, the time of the next event will be adjusted so that the measure and step of that event will remain the same. See the section on INSERT and ADJUST for more details.

Defaults and Shortcuts for Event Editing

If a field is left empty when editing or entering a note or other event, then the value in that field will default to some value which depends on the event type and other factors. If all fields are left blank, and the previous line in the event list is an ON event, then each field will default to the value in the previous line, except the TIME field, which always defaults to zero. If the previous event is not an ON event, the defaults are not always predictable. Usually, the TYP field defaults to the value in the previous line, and all other empty fields default to zero. If the octave number in a note on event is left blank, the default is the octave in the previous line; the same holds for octave values entered without notes.

There is also a group of single letter abbreviations for commonly used TIME values. Typing any of these abbreviations while the cursor is in the TIME column will cause the program to immediately display the selected time in the TIME column. The TIME abbreviations and the corresponding number of steps using the system default of 24 steps/quarter note are given in the following table:

Key	Value	Steps	Dotted	Triplet
A	Last used			
C	Last calculated			
Z	Zero	0	0	0
W	Whole note	96	144	64
H	Half note	48	72	32
Q	Quarter note	24	36	16
E	Eighth note	12	18	8
S	16th note	6	9	4
T	32nd note	3	5	2

The "last calculated" value associated with the abbreviation "C" refers to the value returned by the most recent use of the CALC edit option, described later in this chapter.

A dotted note of any of the types listed can be entered by pressing CONTROL and the letter at the same time. A triplet is entered by pressing SHIFT and the letter. Changing the STEPS/BEAT setting, on the

SET OPTIONS screen, will change the number of steps for each letter in the table correspondingly.

Event Types

The KCS recognizes 22 different types of events. Seven of these are MIDI events and the rest are non-MIDI. A sequence or track may contain different types of events. The seven MIDI events that the Keyboard Controlled Sequencer recognizes are:

ON - Note on
OF - Note off (also entered as OFF)
PG - Program change
CC - Control change
AT - Aftertouch, or channel pressure
PB - Pitch bend
* - Single byte event

The non-MIDI events are:

PRIMARY sequence start (1 - 9, A - Z)
ST - Secondary sequence start
XX - Sequence stop
XL - Loop stop
MS - Mute sequence
US - Unmute sequence
PT - Transpose sequence pitch
VT - Transpose sequence velocity
TM - Tempo value
AC - Accelerando (increase tempo)
DC - Decelerando (decrease tempo)
SM - Steps/measure
RA - Random event
CU - Wait until cue
DE - Deleted event (rest)

PRIMARY, ST, XX, XL, MS, US, PT, and VT events are ignored when the program is not in Open mode. ST events can also be used to start PRIMARY sequences by entering a single digit or letter. Each event type is described in detail below.

Note On and Off

ON events are the most common events used in the KCS. The meaning of the data in each field is exactly as described in the explanation of the fields.

When recording note on and note off messages, if any note has a duration of more than 999 clock steps, the DUR value for that ON event becomes 0, and the program records a separate The program maintains 64 duration counters, which are used to keep track of the durations for up to 64 ON events. When this limit is exceeded during playback, the program will cut short the note that would normally end next, and play the new note. This should not be a problem in most applications. One other important point to be aware of when programming durations is that when note on and note off messages are programmed to occur on the same time step, the note off messages are sent after the note on messages. (This is done to keep the note on timing, which is more critical than note off timing, nice and crisp.) This means that if you want to create legato parts without overlapping (slurred) notes, the durations used should be one less than the corresponding TIME values.

Program Change

PG events will make the instrument on the specified MIDI channel change programs. For most synthesizers, you should make sure the instrument is not currently playing a note when it is to change sounds. Some instruments may quietly shut off the note and make the change, while other instruments will make a very undesirable popping sound when changing. When entering a program change, the value under NOTE represents the program number. Not all instruments begin program numbering with 0. See the MIDI and APPLICATIONS chapters and your synthesizer's owner's manual, for specifics on your instruments.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	1	PG	0		
1-	1	2	0	16	PG	5		

Control Change

CC events are control change events. They are generated by a mod wheel, pedal, joystick, sustain pedal, etc. The value under NOTE will represent the controller being changed. The numbers used to represent each controller have been pretty much standardized by the MIDI Manufacturer's Association, and are listed in the MIDI chapter. The value under VEL will be the new value for a control parameter. The range is 0 - 127, but only certain values may be valid for a particular instrument and type of CC event. CC events do not use the DUR column. The following table shows part of a sequence in which the mod wheel was moved slowly seven steps after a note was played.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	1	ON	C 4	64	12
1-	8	2	7	1	CC	1	2	
1-	8	3	0	1	CC	1	4	
1-	9	4	1	1	CC	1	6	
1-	10	5	1	1	CC	1	8	
1-	10	6	0	1	CC	1	10	

CC events can be recorded in real time, or entered one at a time from the edit screen. You will probably find it too time consuming to enter or edit control changes from a continuous controller (mod wheel, pedal, breath controller, etc.) one event at a time. You may find it useful to enter sudden changes from the edit screen, or to create a sequence of controller events and call it up at different points in the piece using sequence start events in Open mode.

Aftertouch

AT events have values from 0 - 127 in the NOTE field, and do not use the VEL or DUR fields. Since AT events use up lots of memory when recorded in real time, you should set the sequencer to not record aftertouch unless it is specifically required.

Pitch Bend

The value entered under NOTE for PB events can be in the range of -8192 to 8191. The MIDI spec allows 14 bits for pitch bend, hence the large numbers. Not all synths interpret these values similarly, so experiment and check your manual. PB events do not use the VEL or DUR columns.

Single Byte Events

A single byte event may be sent over MIDI by entering a * under event TYP and the byte value (0 - 255) under NOTE. This allows sending any system common or system exclusive information from your sequences. When sending a single byte command from the KCS, specify the command in decimal. Some instrument manuals may show commands in hex. In the following example, the single byte events would send a MIDI song select command for song 11.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		*	243		
1-	1	2	0		*	11		

System exclusive messages can be sent by entering a single byte event for each byte in the message. This is obviously impractical for long sysex messages such as program dumps, but works well for shorter messages. NOTE - IT IS THE USER'S RESPONSIBILITY TO UNDERSTAND HOW A PARTICULAR INSTRUMENT WILL RESPOND. PLEASE DO NOT CALL DR. T'S MUSIC SOFTWARE WITH QUESTIONS REGARDING THE RESPONSE OF YOUR INSTRUMENTS TO SYSTEM EXCLUSIVE DATA.

Version 1.6 of the KCS has the ability to record short system exclusive messages as single byte events. See the SET OPTIONS and TIPS AND TROUBLE SHOOTING chapters for details.

Sequence Control Events

There are eight types of sequence control events that can control the playing of other sequences. These are PRIMARY events (which start primary sequences), ST events (which start secondary or primary sequences), XX events (which stop a sequence), XL events (which stop a sequence from looping), MS events (which mute a sequence), US events (which unmute a previously muted sequence), PT events (pitch transposition) and VT (velocity transposition). These event types can be created only from the edit screen, and are ignored if the program is in Track mode or Song mode.

The next few sections of this chapter describe how each of the sequence control events work. For more information on control sequence techniques, see Chapter 13.

Primary Events

PRIMARY events are used to start any primary sequence (1 - 9, A - Z), When a PRIMARY event is encountered, the sequence whose key is specified will be started automatically. The value under NOTE will be a pitch transposition in half steps, while the number under VEL represents a velocity transposition. The permissible range for each is -64 to 63. If a note is transposed out of the MIDI keyboard range, it will be transposed to the end of its range. If a channel has been designated as a drum channel (see Chapter 11), that channel will not be affected by any pitch transpositions.

The following sequence will start sequences A, 2, and F as soon as it is started. A will be transposed up two half steps, and 2 will be transposed down four half steps.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	2	0	1
1-	1	2	0		2	-4	0	1
1-	1	3	0		F	0	0	1

The value under DUR is the number of times the sequence will repeat. It overrides the originally programmed repeat value for the sequence. If the value under DUR is 99, the sequence will repeat until stopped by the user or by an XX or XL event. A W in the DUR column represents a WAIT flag. This causes the control sequence to wait until the sequence started by the sequence start event has finished before any new events can begin. In the next example, the program will start sequence A and play it four times. No other events in the sequence will be played until sequence A completes its four repetitions. When sequence B is started, the control sequence will wait again.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	0	0	4W
2-	1	2	96		E	-2	8	1
5-	1	3	288		A	7	12	2
5-	1	4	0		B	0	0	2W

ST Events

ST events are another form of sequence start event. Secondary sequences can only be started using ST events, or from the numeric keypad. To type in an ST event, put the desired event time under the TIME column, put ST under TYPE, and put the desired sequence (primary or secondary) under NOTE. If you would like to specify a pitch transposition, enter it in the VEL field. Specify the number of repeats under DUR. You cannot specify a velocity transposition with an ST event.

Note that secondary sequences can start other sequences (including primary sequences) with sequence start events. In this example, sequences 01, 23 and A are started a measure apart. Sequence 23 will play twice, transposed up eight half steps. Sequence A will play four times, and the control sequence will wait for sequence A to finish before proceeding.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		ST	01	0	1
2-	1	2	96		ST	23	0	2
3-	1	3	96		ST	A	0	4W

XX and XL Events

XX events are sequence stop events. They allow you to automatically stop one or more sequences, even in the middle of playing. To stop a single sequence with an XX event, enter XX under TYP, and the desired sequence, left justified, under NOTE, as shown below.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
3-	1	1	192		XX	23		
7-	1	2	384		XX	A		
9-	1	3	192		XX	01		

More than one sequence may be stopped with a single XX event by placing an asterisk (*) under NOTE. An asterisk by itself will stop all sequences that are currently playing (active), or an asterisk followed by a channel number will stop all active sequences that start with an event on that channel. The following example would immediately stop all sequences on channel 1, then stop the remaining sequences one measure later:

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		XX	*1		
2-	1	2	96		XX	*		

Note that sequence control events that use the * option take longer to execute than similar events affecting only one sequence, and may result in audible delays if overused.

XL events are much like XX events, except that the sequences specified in the NOTE field will continue to play to their ends before stopping.

MS and US Events

MS and US events are much like XX and XL events, except that the specified sequences will be muted rather than stopped. The main difference is that when a sequence is muted, it will continue to play, but the events in the muted sequence will not be executed. This is useful if, for instance, you are creating a piece by stringing together complex control sequences, and would like to remove a portion of a sequence from one occurrence of a particular section, without actually editing the affected sequences. Inserting an MS event in the master control sequence, followed by a US event at the appropriate time, will "blank out" the designated sequence in that portion of the composition.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		ST	01	0	1
2-	1	2	96		MS	01		
3-	1	3	96		US	01		

As with the XX and XL events, multiple sequences may be specified in MS and US events using a * in the NOTE column.

PT and VT Events

PT and VT events cause a pitch or velocity transposition to occur in the specified sequences. The sequence number, or an asterisk and an optional channel number, are entered in the NOTE column, and the transposition amount, from -64 to +63, is entered under VEL. If the DUR column is blank, the value under VEL is added to the current transposition value for that sequence, or if an S is placed in the DUR column, the program will set the transposition to that value. Notes played on the drum channel are not affected by PT events. The pitch and velocity transpositions for each sequence are set to 0 when the sequencer is started, and transpositions will be "chased" when starting from a cue point.

In the following example, secondary sequence 01 is transposed up an octave from it's current transposition, and four measures later, all active sequences that start with events on channel 3 will be set to a velocity transposition of 0.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		PT	01	12	
5-	1	2	384		VT	*3	0	S

When a PT or VT event is encountered in a sequence while playing from the Open mode play screen, the first four letters of the sequence's name will be replaced on the screen by the sequence's pitch transposition, and the last four letters by the sequence's velocity transposition.

TM Events

TM events in a sequence will immediately force the internal clock to change the tempo to the specified value. Sequences may have more than one TM event. In fact, several sequences may contain TM events. When a TM event is encountered the tempo will change to that value until another TM event is encountered.

TM events have no effect on the tempo if the program is using MIDI clock as its clock source, though they are used for calculations when synchronizing to an external clock. See the section on timing resolution in Chapter 13 for details.

Enter TM under TYP, the desired tempo (in beats per minute) in the NOTE field, and the tenths portion of the tempo under VEL.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	0	0	4
2-	1	2	96		E	0	0	1
5-	1	3	288		TM	140	2	
5-	1	4	0		B	0	0	2W

In this example sequence A is played four times, one measure later sequence E plays one time, and three measures later the tempo is set to 140.2 BPM as sequence B starts playing. You should put a TM event as the first event in your control sequence to assure that it always plays at the correct tempo.

To maintain optimum accuracy when using the real time clock or synchronizing to an external MIDI clock, you should place all TM events on multiples of six clock steps. This is because MIDI song pointer messages (which are used in conjunction with tempo settings and a SMPTE or equivalent synchronizer to communicate the time of day between the KCS and external devices) are quantized in units of six MIDI clocks.

AC and DC Events

AC and DC events are used to create proportional changes in tempo, as opposed to the absolute changes created by TM events. Entering a number between 1 and 3000 under NOTE will cause the tempo to change by that number of parts in 1024. For example, if an AC event has a value of 1024, the tempo will double, or if the number under NOTE were 512, the tempo would increase by 50%. AC events cause an increase in tempo, while DC events cause a decrease in tempo. AC and DC events can only be entered from the edit screen.

Gradual tempo changes can be made by creating a string of evenly spaced AC or DC events, and playing them along with a sequence or track either by merging them into the sequence or track, or by playing them simultaneously from a separate sequence or track. This example would cause the tempo to increase by 10% over the space of one measure.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		AC	13		
1-	13	2	12		AC	13		
1-	25	3	12		AC	13		
1-	37	4	12		AC	13		
1-	49	5	12		AC	13		
1-	61	6	12		AC	13		
1-	73	7	12		AC	13		
1-	85	8	12		AC	13		
2-	1	9	12		DE			

Generally speaking, the best way to add AC or DC events to a sequence is to first add one or two by hand to determine the correct values and spacing to use, then using the PASTE edit option to merge multiple copies of these events with the sequence or track. As with TM events, AC and DC events should be placed on multiples of six clock steps for best results when using the real time clock. You should also remember to start any pieces that contain AC or DC events with a TM event. Otherwise, you will need to reset the tempo each time you play the piece.

DE Events

DE events are most often used at the end of a sequence to instruct the computer to wait a specified number of steps before looping or going on to play the next sequence. In the following example sequence A starts (and repeats four times), and four measures later (384 clock counts) the sequence shown ends. If another control sequence is waiting for this one, that sequence will now continue playing.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	0	0	4
2-	1	2	384		DE			

DE events may also be used to erase or silence a wrong note without affecting the numbering of subsequent events, by typing DE over the event type of the undesired note. Clicking anywhere on the event line and pressing the DELETE key followed by RETURN will have the same effect.

SM Events

SM events are used to change the sequencer's steps/measure setting during playback. This will have no effect at all on the music being played, but it will change the operation of the measure/step counter. Use SM events anywhere that the music changes time signatures, and the new time signature will be used by the measure/step counter during playback. The number of steps/measure is entered under NOTE, and the remaining fields are unused.

If you use a lot of SM events in a portion of a piece to represent a varying time signature, it may prove less confusing to use a single SM setting that is one beat long, and then treat the measure/step display as a beat counter. See the SET OPTIONS chapter for more information on the steps/measure setting, as well as a table of common time signatures and their corresponding steps/measure values.

RA Events

RA events are used to select one of a number of events at random. The "hat" out of which an event is drawn is a list of events immediately following the RA event, and the length of this list is set by the number in the NOTE column. The limits for the length of the list are 2 - 255. After the selected event is executed, the sequence or track will continue from the next event after the end of the list.

Here are two examples that illustrate the use of the RA event. The first will play one of the five notes in the list, then continue from the G4. Note that since the D4 occurs twice in the list, it is twice as likely to be selected as any of the others.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		RA	5		
1-	1	2	0	1	ON	D 4	77	5
1-	1	3	0	1	ON	A 4	77	5
1-	1	4	0	1	ON	F# 4	77	5
1-	1	5	0	1	ON	D 3	77	5
1-	1	6	0	1	ON	D 4	77	5
1-	7	7	6	1	ON	G 4	84	5
1-	13	8	6	1	ON	A 4	76	4

The next example shows how an RA event is used to change the structure of a piece of music, by selecting from a list of sequence control events. The sequences in the list could each be a set of tom rolls, for instance, which would inject an illusion of spontaneity into a drum part.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		RA	4		
1-	1	2	0		ST	01	0	1
1-	1	3	0		ST	11	0	1
1-	1	4	0		ST	03	0	1
1-	1	5	0		ST	05	0	1
2-	1	6	96		ST	23	0	1
3-	1	7	96		ST	A	0	4W

The TIME values for the list of possible events are ignored when playing, though they should all be set to 0 to avoid confusion when editing tracks or sequences, and especially to avoid conflicts when merging tracks or sequences. Also note that while the RA event is recognized in all three modes, the list of candidate events should only contain events that are appropriate for that mode.

CU Events

CU events cause the sequence, track, or song that contains them to wait until a specified time on the real time clock. The NOTE, DUR, and VEL columns hold the minutes, seconds, and tenths of seconds values for the cue point. Minutes can be any value from 0 to 255, and seconds, of course, must be less than 60. CU events are ignored if the MIN:SEC switch, on the SET OPTIONS screen, is turned off.

Care should be exercised when using CU events. If the time specified has already passed when the event occurs, the program will think that it is late, and will spew out notes and MIDI clocks at maximum speed, in an attempt to catch up with itself. This can happen if a sequence containing a CU event is looped, or if tracks containing CU events are appended or doubled.

See the section on TIMING RESOLUTION, in Chapter 13, for more information on the real time clock.

Edit Options

The right half of the screen displays the available edit options. When an edit option is selected, a message will appear on the message line, and a dialog box or an edit window may appear. Dialog boxes and edit windows are described in Chapter 1 of this manual, and details on the individual edit options appear below.

Name and Comments

The name of a track or sequence consists of eight characters. When you start to record on an unnamed track or sequence, the program will name the track or sequence with the MIDI channel number. The event type will be part of the name if the first event is not a note. If you click on NAME, the edit cursor will move to the top of the screen where the name is displayed. Type in the new name, and press RETURN.

In Open mode, a thirty character comment field, directly below the EVENTS LEFT line, can also be accessed by clicking on NAME. Typing more than eight characters in the name, or using the cursor control keys after clicking on NAME, will move the edit cursor to the comment field.

Transpose/ Auto

The TRANSPOSE/AUTO option manipulates data in a variety of ways. An edit window appears in which you can specify the range of events to be processed, the operation to perform, and the parameters used by the available options. Only one of the available options can be chosen for a single edit operation.

The range of events to be edited is selected by clicking on ALL, EVENT RANGE, or MEASURE RANGE. If either of the last two options is chosen, the numbers to the right of these buttons set the upper and lower limits of the range.

Clicking on UNDO or pressing the UNDO key after a TRANSPOSE/AUTO operation will return the track or sequence to its previous state.

Pitch, Velocity, and Duration

The PITCH, VELOCITY, and DURATION transpose options allow you to transpose (change by a constant amount) or invert the pitch, velocity or duration of all ON and OFF events in the range processed. Pitch transposition has many obvious uses and is found in all serious sequencer programs. Inversion and velocity and duration transpositions are logical extensions of this concept. You will probably transpose pitch much more often than any of the others, but they are there any time you have use for them.

After selecting PITCH, VELOCITY, or DURATION, click on TRANSPOSE or INVERT. The number next to TRANSPOSE is the transposition amount (-63 to +63), and the value beside INVERT sets the center point for the inversion. Transposing pitch by -12 drops all notes down one octave, and a pitch transposition of 7 would raise the pitch up seven half steps (a fifth). A velocity transposition of 24 increases all MIDI velocities by 24 (making the notes louder or brighter, depending on your synth's response to MIDI velocity), and transposing duration by -3 shortens all notes by three time steps (making notes more staccato). The program will assign the largest or smallest allowable value to a pitch, velocity, or duration if you attempt to transpose out of range. It is possible to transpose pitch, velocity and duration to values that are not useful for your instrument and patch.

Selecting INVERT causes high values to become low and low values to become high. The acceptable range for the inversion point is 1 - 127. The program will perform the inversion around the value you enter. For example, if you invert velocity around 50, a velocity of 70 will become 30, while a velocity of 20 will become 80.

If you are inverting pitch, the number that you enter must be the MIDI key number of the pitch that you wish to invert around. MIDI key numbers range from 0 for the lowest MIDI key (C -1 in our notation), to 127 for the highest, G9. The MIDI chapter has a table of note values and MIDI note numbers. To invert pitch around middle C, enter a value of 60. Inverting the C scale from sequence 1 around middle C will produce a descending scale that goes from C4 down to C3. Be careful, though, since inversions will usually cause the part to change keys, except for certain inversion points. In the example of the C Major scale, inverting around 60 changes the scale to a C Phrygian scale, while inverting around 62 gives an E Major scale, etc.

Auto-Correct

AUTO-CORRECT is used to round all of the TIME and/or DUR values in a track or sequence to multiples of some number. This is usually done to smooth out the timing of a less than perfect recording, but can also be used for special effects. The number next to AUTO-CORRECT sets the step count for auto-correction. After auto-correction, all times in the selected range will be a whole number multiple of the step count. The following table shows the step counts corresponding to several common note values at the standard 24 steps/beat:

3 for 32nd notes
6 for 16th notes
12 for 8th notes
24 for quarter notes
96 for whole notes
4 for 16th note triplets
8 for 8th note triplets
16 for quarter note triplets
48 for half notes

The number next to DUR on the same line has a similar effect on the durations in the selected range; this entry is optional. You can also quantize only the duration by leaving out the value for step count. When duration is auto-corrected, the resulting duration values are actually one less than the nearest multiple of the duration auto-correct value. For instance, entering a value of 6 for duration auto-correction results in duration values of 5, 11, 17, etc. instead of 6, 12, and 18. This allows notes played on monophonic instruments to retrigger when legato parts are played, by ensuring that a note off message is sent before the next ON event in the sequence or track.

When a portion of a track or sequence containing events other than ON and OFF events is auto-corrected, the program treats all the non-note events between each pair of On events as part of the first note, and moves them along with that note. This is handy if a sequence contains pitch bends or other controller messages that you want to tie to particular notes. If you want to auto-correct a part without affecting the non-note data, use the SPLIT edit option to separate the note data to another track or sequence, as described later in this chapter.

Compress/ Expand

The COMPRESS/EXPAND option changes the timing of the overall sequence or track. This option can also be used to speed up or slow down a part, relative to the other parts of your song. The number next to COMPRESS/EXPAND sets the amount of compression or expansion (in percent), and the DUR button on the same line causes durations to be affected as well as time. Each note's TIME and/or DUR value will be multiplied by the amount you enter, divided by 100. Entering an amount of 200 results in a sequence or track which is twice as long as the original, 50 makes the part half as long, etc.

Time Reverse

The TIME REVERSE option will re-arrange events so that they play in reverse order. The TIME values of the first and last notes are not changed, and if the last event in the range selected is a DE event, it won't be affected either. Note that since the value in the TIME field represents the amount of time that elapses before an event occurs, time reversal will not preserve the relationship between an event's TIME and DUR values. For example, consider the following sequence:

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	1	ON	C 3	50	10
1-	13	2	12	1	ON	D 3	50	10
1-	25	3	12	1	ON	E 3	50	10
1-	37	4	12	1	ON	F 3	50	10
1-	49	5	12	1	ON	G 3	50	10
1-	61	6	12	1	ON	A 3	50	10
1-	73	7	12	1	ON	B 3	50	10
2-	1	8	24	1	ON	C 4	50	94
3-	1	9	96		DE			

Reversing the order of this sequence yields:

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	1	ON	C 4	50	94
1-	25	2	24	1	ON	B 3	50	10
1-	37	3	12	1	ON	A 3	50	10
1-	49	4	12	1	ON	G 3	50	10
1-	61	5	12	1	ON	F 3	50	10
1-	73	6	12	1	ON	E 3	50	10
1-	85	7	12	1	ON	D 3	50	10
2-	1	8	12	1	ON	C 3	50	10
3-	1	9	96		DE			

Now the C4 with the duration of 94 sustains while the other notes are playing. In a case such as this, you might want to swap the durations of events 2 and 9, to preserve the original timing relationships.

Channel Assign

CHANNEL ASSIGN changes the MIDI channel numbers of events in the selected range. If only the first of the two data fields to the right of this switch contains a value, all events will be assigned to this channel; if both values are present, then consecutive events will be assigned to the next higher MIDI channel within the specified range. This is useful for playing polyphonic parts on a synth in Mono mode, or for adding spice to an arrangement.

Velocity Scale

Selecting VELOCITY SCALE will create a "velocity fade-in" or "velocity fade-out", depending on the values you give it. The values next to this button represent the beginning and ending velocities; leaving the second field empty will set all velocities to the first value.

The range for velocity is 0 - 127, with 127 being the loudest or brightest. Synths that respond to velocity can often be programmed to respond in several different ways, so the result of your velocity scale will depend on the particular patch you are using on your instrument. Here is a monophonic sequence consisting of sixteenth and eighth notes all at the same velocity.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	1	ON	C 3	50	10
1-	7	2	6	1	ON	C 3	50	10
1-	13	3	6	1	ON	C 3	50	10
1-	19	4	6	1	ON	C 3	50	10
1-	25	5	6	1	ON	C 3	50	10
1-	31	6	6	1	ON	C 3	50	10
1-	37	7	6	1	ON	C 3	50	10
1-	43	8	6	1	ON	C 3	50	10
1-	55	9	12	1	ON	C 3	50	10

If we apply velocity scaling and enter a starting velocity of 100 and an ending velocity of 1, the sequence will now look like this:

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	1	ON	C 3	100	10
1-	7	2	6	1	ON	C 3	89	10
1-	13	3	6	1	ON	C 3	80	10
1-	19	4	6	1	ON	C 3	66	10
1-	25	5	6	1	ON	C 3	58	10
1-	31	6	6	1	ON	C 3	45	10
1-	37	7	6	1	ON	C 3	34	10
1-	43	8	6	1	ON	C 3	23	10
1-	55	10	12	1	ON	C 3	1	10

Note that the difference in velocity between the last two events is twice that between any other two events. This is because the KCS scales velocity linearly over time, *not* the number of events. Since the time of the last note is twice that of the others, the velocity drops twice as much in that time period as in the others.

Erase Controllers and Clear Deletes

The ERASE CONTROLLERS option is used to strip all MIDI data except note on and off events from the selected range. CLEAR DELETES is a convenience feature which erases all DE events from a sequence or track, except for the final "trailing" DE, if any. This option affects the entire sequence or track.

Insert and Adjust

These options are used to insert new data in a sequence or track at the current position of the edit cursor. Clicking on either will create a new blank line ahead of the current event, at which point new events can be typed in as described earlier in this chapter.

When INSERT is selected, events are simply inserted in the sequence or track, with no adjustments to timing. When ADJUST is chosen, the program will attempt to keep the length of the sequence constant, by subtracting from the TIME value of the first event after the insert point. If the TIME value for this event becomes 0, the program will no longer be able to adjust, and the length of the sequence or track will increase as more events are entered.

You can also insert new material by pressing the INSERT key. In this case, the program will use the most recently chosen of the INSERT or ADJUST options.

When you have finished inserting, use the cursor keys to move to a new event line or click the left mouse button.

Cut, Copy, and Paste

The CUT, COPY, and PASTE options are among the most powerful in the KCS. These commands utilize what we call the **paste buffer**. You can use the paste buffer to move and copy part or all of a sequence or track to another sequence or track. The same paste buffer is used for Open and Track modes, so you can use this to move information between the two modes. Any time you CUT or COPY, the previous contents of the paste buffer are discarded.

Cut

The CUT command will delete or erase the events in a desired range and place the events into the paste buffer. The CUT edit window allows you to set a range by event or by measure. Cutting all the events in a sequence or track is not allowed. Click on EVENT RANGE or MEASURE RANGE to set the range; the values to the right of these buttons contain the start and stop points for the cut.

DELETE ORIGINAL and ERASE ORIGINAL affect the data that is left in the original sequence or track. DELETE ORIGINAL will remove the specified section and shorten the sequence or track. ERASE ORIGINAL removes the events specified but adds their time values to the next event after the selected range, thus preserving the original timing.

ZERO FIRST TIME forces the TIME value of the first event to zero; this is usually the most convenient value when pasting. Click on OK, and the data will be moved to the paste buffer. This data will remain in the paste buffer until you next use the CUT or COPY command.

Copy

The COPY command is identical to the CUT command, except that the selected range is not deleted or erased from the sequence or track. It is also possible to copy all of a sequence or track.

Paste

Once you have moved data into the paste buffer using the CUT or COPY command, you can use the PASTE command. There are a number of different ways to paste material to a track or sequence, which are outlined below. Because the PASTE edit window has so many options, a HELP button has been provided, next to the standard exit buttons.

When you use PASTE in Track mode, remember that all tracks will loop when track 1 finishes playing. Notes that are pasted onto a track at a measure and step that is past the end of track 1 will not sound when all tracks are played at once, and extending track 1 will cause a gap in the other tracks when the sequencer loops.

PASTE OPTIONS

INSERT will place the contents of the paste buffer at the specified location, without changing the existing data at the paste location. INSERT is like cutting a piece of tape, and splicing in one or more copies of the paste buffer. The rest of the sequence will be pushed back in time, and the sequence will become longer.

REPLACE will take the contents of the paste buffer and put it at the specified location. The previous contents of the sequence will be written over for the length of the phrase. REPLACE is like erasing a section of tape and replacing it with the contents of the paste buffer. The timing of events after the end of the paste will not be altered.

MERGE will mix the contents of the paste buffer with the sequence. Both parts will play with their original timing. The result will be the same as if both the sequence and paste buffer were played together.

MERGE TO END is similar to MERGE, except that copies of the paste buffer are mixed into the sequence, one after the other, until the end of the sequence is reached. A simple application would be to have the paste buffer consist of one note, say a bass drum hit on a drum machine. Setting the phrase length to 96 steps (one measure) and performing a MERGE TO END would cause one bass drum hit to be added every measure of the sequence.

FILL TO END is like REPLACE, except that all data is erased from the sequence after the paste location. This data is replaced with enough copies of the paste buffer to make the resulting sequence the same length as the original.

After an INSERT or REPLACE paste operation is executed, the pasted range will be highlighted in the event list. This allows you to see that the paste was done properly.

PHRASE LENGTH

The length of the phrase which is pasted to the new location can also be changed by entering a phrase length, in measures and steps, under PHRASE LENGTH. These features can be particularly useful when doing multiple pastes. Note that the program will not allow you to increase the time or decrease the phrase length in a way which affects the relative timing of the events being pasted.

LOCATION

There are two different ways to select a paste location: either by event number, or by specifying a measure and step. If you specify EVENT NUMBER, the paste occurs immediately before the event specified to the right of the button. If you want to paste at the beginning of the sequence, enter 1.

MEAS/STEP is used primarily when you want to paste at a point in the sequence which is not a location of an event in the sequence. The program will do the paste before any events at the selected measure and step. Remember, the sequence or track begins at measure 1, step 1, and the first step of any new measure is step 1 of that measure, NOT step 0.

The values for EVENT NUMBER and MEAS/STEP will default to the current location of the edit cursor.

Times to Paste and First Event Time

You can also select the number of times you wish to paste. The program will paste copies of the paste buffer, one after the other, for the number of times selected. TIMES TO PASTE is used for the first three paste options only; it is ignored if you select FILL TO END or MERGE TO END.

FIRST EVENT TIME sets the time of the first event in the paste, same as in the CUT and COPY edit windows.

Backup, Get Backup, and Undo

Clicking on BACKUP will make a copy of your current sequence or track. The message "Backup accomplished" will appear on the message line, or an error message will appear if there is no room for the copy. It is a good idea to make a backup before making any change that can not easily be reversed.

The GET BACKUP command exchanges your current sequence or track data with the most recently made backup. This allows you to swap and compare the sequences.

A separate backup sequence is created whenever a TRANSPOSE, CUT, PASTE, DELETE, ERASE, or SPLIT operation occurs. Clicking on UNDO or pressing the UNDO key will swap this sequence with the altered original track or sequence.

The manual and automatic backups are stored by the program in sequences Y and Z, respectively. You can thus hear either backup sequence from the Open mode play screen by pressing the appropriate key. If you decide that you want to keep both your edited material and the backup, copy the edited sequence or track to a new location and retrieve the original data by clicking on GET BACKUP or UNDO.

If you are planning extensive changes to a sequence or track, you may wish to make a copy of your original using one of the copy commands described below before you start editing, and then make frequent backups as you edit.

Delete and Erase

DELETE and ERASE are used to remove a range of events from a sequence or track. DELETE will shorten the length of the sequence or track, while ERASE preserves the length of the sequence or track by adding the time values of the events that are erased to the time of the first event after the selected range.

After choosing one of these options, a dialog box will prompt you for the range of events to be removed. The beginning and end of the range can be specified by typing in the event numbers for each, or they can be set to the beginning or end of the sequence or track by clicking on START or END. It is not possible to delete or erase an entire sequence or track - at least one event must remain.

Text and Map

Clicking on TEXT provides access to a 16 line by 68 character text area, which can be used to hold comments about a piece. The text area is saved and loaded with .ALL files.

The mouse and the BACKSPACE and cursor control keys can be used to move the cursor around the text area, and the CLR HOME key will erase the entire line which holds the cursor. Note that .ALL files saved by versions of the program before 1.5 will display gibberish in the text area when loaded. This is normal, and can be written over with no danger of damaging your data.

The MAP option displays a map of all tracks, sequences, and songs in memory, including their names, comments, and lengths in measures and events, as well as the channel number and event type of the first event in each track and sequence. The map and text area may be listed to a printer by pressing P after the map is displayed on the screen. The CONTROL key will terminate printing when sending the map to a printer. If SHIFT is held down when MAP is selected, the map will be sent directly to the printer, without going to the screen.

Print

PRINT sends a copy of the current sequence or track to the printer. The range is set as described above for DELETE and ERASE. If there is no printer connected or if the printer doesn't respond, a dialog box will ask if you want to abort or try again.

Change Repeats

This option, which only appears in Open mode, sets the number of times a sequence will play when started from the Open mode play/record screen. A dialog box will ask you to specify a number from 1 - 99. Enter 99 if you want the sequence to repeat indefinitely. When a sequence is started from a control sequence, it will play the number of times that are specified by that control sequence.

Step Time Track

STEP TIME APPEND is used to enter notes at the end of the current sequence or track with the step time recording feature of the KCS. See Chapter 9, STEP TIME RECORD for more information. If you are in Track mode, you should remember that the effective length of all tracks is the length of track 1. Appending to track 1 thus increases the effective length. Appends that make another track longer than track 1 will not be heard when all tracks are played together.

STEP TIME TRACK allows you to create a new track in step time. A dialog box will ask the measure at wish you wish to start recording, and the program will set the time of the first event recorded so that it is at the selected measure. This feature allows you to add new material at any point in a set of tracks.

Pressing F1 or left clicking on EXIT when in step time record will return you to the edit screen.

Find and Calc

FIND is used to locate a particular measure in a track or sequence. Entering a number after clicking on FIND will place the edit cursor on the event nearest to the start of that measure.

The CALC option is a convenience for calculating the number of steps between two points. Click on CALC, and an edit window will prompt you for two measure/step values, the second of which defaults to the current position of the edit cursor. After entering the values and clicking on OK, the difference between those two points, in steps, will be shown on the message line. If the exit button labeled CORRECT is chosen instead of OK, the program will attempt to "correct" the time of the current step to that in the second measure/step entry by adding the calculated time to the current time. This allows you to enter a new event location in terms of it's measure and step directly in the CALC window, without dealing with the TIME setting.

After CALC is used to compute a time value, typing a "C" in the TIME column will enter the calculated time value at that point.

Split

SPLIT allows you to split the current sequence or track into two parts by note value. A dialog box will ask you to specify the entire sequence or a range. It will also ask for a split point. This must be entered as a MIDI note number (60 = middle C). All note events with note values greater than or equal to the entered note number will be copied to the first unused sequence or track, and erased from the original sequence. Selecting SPLIT with a split point of 60 will therefore remove all notes at or above middle C (C4) from the current sequence or track and place them on a new one.

SPLIT followed by CHANNEL ASSIGN allows you to create a split keyboard effect for a part that was recorded on a single MIDI channel. It is also possible to nondestructively separate all the note data in a track or sequence from any control changes, pitch bends, or non-MIDI events by setting the split point to 0; in this case, all note data will be sent to the new sequence or track, and the original sequence or track will contain only the other data types.

Vary

The VARY option is used to generate a variation on the current sequence or track by randomly changing the pitches, velocities, and/or location of the ON events in the sequence. The original sequence or track is unaffected, the variation is placed in the first available sequence or track, and the variation is selected for editing. In Track mode, the original track is also muted.

The VARY dialog box displays six **variation presets**, and asks for the number of individual variations to perform. The actual number of variations performed might be lower, as sometimes a note will be randomly chosen for variation more than once. The presets consist of different algorithms for altering the sequence or track. HALFSTEP changes the pitch of a randomly selected note by a semitone. This will add new notes to the sequence or track and thereby change the tonality of the phrase. PITCHES randomly transposes selected notes by larger amounts, but won't allow any new notes to be created. (For instance, if the original sequence consisted of nothing but C4s and C5s, the variation might contain C4, C3, C5, etc., but no Bs or other notes.)

SWAPS will randomly swap the pitches and velocities of two notes; if they are adjacent notes, the time, channel and duration values may also be swapped. The first note of the sequence or track is not affected by SWAPS.

DYNAMICS randomly varies the velocities of the notes in the sequence or track. The amount of variation is determined by the amount in the original.

MIX 1 and MIX 2 make random changes to the pitches, velocities and durations of selected notes. The amount of variation will depend on the amount of variation in the original sequence or track. MIX 1 will allow new notes to occur, and MIX 2 only permits notes that are found in the original to be used.

The VARY feature in the KCS is a very early spinoff from the Programmable Variation Generator/Master Editor portion of the Level II KCS, which is available as an upgrade to owners of the current KCS. Contact us or see our advertising for details.

Copy Sequence, Copy Track to Track and Copy Track to Seq

Each of these options makes a permanent copy of the current sequence or track. In Open mode, the COPY SEQUENCE option will bring up a dialog box asking you to select the sequence that you wish to copy to. The default will be the first unused sequence. If you copy to an existing sequence, that sequence will be lost.

In Track mode, there are two ways to make a copy. COPY TRACK TO TRACK will copy the current track to the first unused track. Remember that both this track and the current track will play unless you mute one of them. The MUTE and SWITCH features described in Chapter 6 allow you to easily compare the original and edited track within the context that they are to be used.

COPY TRACK TO SEQ is used in the same way as COPY SEQUENCE. This option is useful for making a backup that will not be heard with your other tracks in Track mode. It is also useful if you have a part that you want to use in Track mode in more than one context, as you can use the COPY SEQ TO TRACK option to get it back into Track mode at a later time.

Copy Seq to Track

This option copies an Open mode sequence into the first unused track in Track mode. Note that neither this option or the APPEND and MERGE options described below will have any effect on the sequence being copied, merged or appended.

Seq to All Tracks and All Tracks to Seq

These options allow you to move data back and forth between the 48 track tape recorder environment of Track mode and individual Open mode sequences. These sequences can be chained or otherwise combined into longer pieces in Song mode or by using control sequences in Open mode.

SEQ TO ALL TRACKS copies an Open mode sequence into Track mode. All existing tracks are erased by this option. Events in the sequence copied will be sorted by MIDI channel, with each channel assigned to a different track, which makes this option handy for unmerging open mode sequences, for editing channels independently, and for splitting up sequences recorded from another sequencer. Each track will be named with the channel of the data that it contains.

ALL TRACKS TO SEQ will merge the data from all active tracks (tracks that are not muted) into a single Open mode sequence. The length of the merged sequence will be determined by the length of Track 1. For some applications, you may want to create different sequences using this option with different combinations of muted and unmuted tracks.

When ALL TRACKS TO SEQ is chosen, an edit window will appear after the sequence selection dialog box, in which you can enter a name and comments for the sequence. The comments for the sequence will default to a list of the unmuted tracks, or the list can be cleared by clicking on the field and pressing CLR HOME. The edit window also has a button labeled INCLUDE MUTED TRACKS. If INCLUDE MUTED TRACKS is turned on, all tracks will be copied to the new sequence, regardless of their status. ALL TRACKS TO SEQ can also be selected directly from the Track mode play screen with the ! (SHIFT-1) key.

Append and Append Seq to Track

These options allow you to append an Open mode sequence to the current sequence or track. A copy of the appended sequence is simply tacked onto the end of the sequence or track being edited.

Merge

Available in Open mode only, this option merges a second sequence with the sequence being edited. The sequence will now sound as though both sequences were playing at once. In Track mode, this task is accomplished using the BACKSLASH key from the play/record screen.

Delete Sequence and Delete Track

These options allow you to delete an unwanted track or sequence. A dialog box will request the sequence or track number; the selection in this box defaults to the current track or sequence. Sequences Y and Z and track 1, can not be deleted.

Clear and Double

CLEAR erases all tracks in memory. It does not erase anything from Open or Song modes. An edit window will allow you to set the length of all tracks, in measures. If you do so, the program will create track 1 with a single DE event whose TIME is the desired length. This will determine the effective length of any additional tracks that you record. If you change your mind, you can also cancel the operation from this window. After the clear operation, the program will put you on the Track mode play/record screen.

DOUBLE simply doubles the length of all tracks. Any events which would have played after the end of track 1 are lost. Since the length of track 1 sets the loop point for all 48 tracks, you could extend a set of tracks by half their length by using the DOUBLE option, then shortening track 1 by the required amount.

Ext (Atari ST Only)

If your ST has 1 meg or more of memory, the EXT option can be used to load up to four other Dr. T programs into memory at once, thanks to our Multi Program Environment (MPE). Clicking on EXT will cause a GEM file selection window to appear, where you must select a .INF file for the program to be loaded. This file contains information about the program to be loaded. If there is enough memory available to load the new program, it will be loaded and a three letter abbreviation for the new program (FIN for Fingers, for example) will appear on the EXT line.

Once an external program is loaded, clicking on it's abbreviation will take you to that program, or clicking here while holding down the SHIFT key will erase the last program loaded and free up the memory used.

Note that the external programs use memory that would otherwise be used for event storage, so there are some tradeoffs involved in loading multiple programs, especially on the 1040 ST (as opposed to a Mega ST, that is). Some programs, especially our algorithmic composers, may also overwrite one or more sequences when they are loaded. Check the manual for each program for this type of thing before loading the program, in order to prevent accidental and unsightly loss of data.

Programs to be loaded via the MPE *must* be loaded from drive A. It is not possible to load MPE programs from a hard disk, even if the original disk is inserted in drive A. Attempting to do so will result in a system crash. .INF files may be stored on any drive, however.

WorkBench, NewCLI, and Drag Bar-> (Amiga Only)

These buttons are used to access the Amiga's multi-tasking functions. The WORKBENCH switch is used to toggle the state of the WorkBench window (that is, open the WorkBench if it's closed, or close it if it's open). If you attempt to close the WorkBench while a window is open on the WorkBench, either a CLI window or a window from some other program, the KCS will not be able to close the WorkBench.

The NEWCLI switch is used to open a CLI window. When this button is selected, the WorkBench screen will move to the fore and a CLI window will appear. The operation of the KCS will be suspended until you type the command "EndCLI".

The DRAG BAR-> button is intended as a reminder on how to toggle the KCS drag bar at the top of the screen. Moving the mouse to the right edge of the screen and clicking the left mouse button will cause a drag bar to appear at the top of the screen. You can now move the KCS screen in relation to any other screens using the gadgets on the drag bar, as with most other Amiga programs.

The Amiga version of the KCS will continue running when other windows are in use (except as noted above), so you may use any of your other Amiga software (including Dr. T's Caged Artist patch editors for the Amiga!) while your music plays. See your Amiga documentation for more on multi-tasking.

Play and Play/Record

These options take you to the play screen of the mode that you are currently in. The Track and Open mode play screens are described in detail in Chapters 6 and 7. The Track mode play screen automatically puts you in record. To record in Open mode, you have to select the record option described below.

The PLAY option displays a dialog box with five options. GO TO PLAY SCREEN takes you directly to the play screen. Double clicking the right mouse button from the edit screen (or single clicking the right mouse while the SHIFT key is held down) will accomplish the same thing. PLAY CURRENT SEQUENCE plays the sequence or track currently displayed. PLAY FROM CURSOR POSITION plays the current sequence or track from the position of the edit cursor; clicking the right mouse button once does the same thing. PLAY CURRENT CUE plays the sequence or track from the current cue point, which can be set from the play screen, or with the SET AND PLAY NEW CUE option. In Open mode, a dialog box will ask for a sequence and a starting measure when the SET AND PLAY NEW CUE option is selected; play will then start from this point. In Track mode, the dialog box will ask you to enter the measure of the new cue point, and all tracks will be started from that measure.

If you choose any option other than GO TO PLAY SCREEN, the edit screen will be displayed during play. The word PLAY will appear on the message line. You can stop play at any point by pressing the left mouse button or F1. You can also restart play from the beginning by pressing F10, the SPACE bar, or the right mouse button. If you do neither, the word PLAY will be erased and all edit functions will return to normal as soon as play completes.

If a range of events is highlighted, then clicking the right mouse button will play only that range. If no events are highlighted, clicking the right mouse will play the track or sequence from the edit cursor position.

Record

This is used to enter the record screen from Open mode only. Open mode recording is described in detail in Chapter 7.

Load/Save

The LOAD and SAVE options are described in detail in Chapter 10.

Set Options

This feature lets you change a number of parameters that are used by different parts of the program. It brings up an edit window that is described in more detail in Chapter 11.

TRACK Mode, OPEN Mode, and SONG Mode	These options, only two of which are available from any screen, are used to move between the program's three operating modes. When you enter Open or Song modes, the program will place you on the edit screen; when you enter Track mode, the program will place you on the play/record screen. You can then get to the Track mode edit screen by pressing F1 or clicking on EXIT.
Colors (Amiga Only)	When the COLORS option is selected, a small requestor box will appear, where you may adjust the screen colors used by the program. The screen colors are automatically saved and loaded with environment (.ENV) files.
Quit	QUIT will exit from the KCS and return you to the desktop (or WorkBench). Be sure to save your data before quitting. A dialog box will ask you to confirm this choice.

Chapter 5

Song Mode Editing

Song mode provides a simple environment for creating longer pieces (songs) by chaining Open mode sequences. This task can be accomplished much more generally with control sequences in Open mode, but Song mode is conceptually much simpler. You may want to create a few pieces in Song mode before you attempt to use control sequences. You may also choose to do all of your sequence chaining in Song mode. Song mode is intended primarily for use with multi-instrument sequences created in Track mode, as only one sequence can play at any time. There is certainly no limit to the complexity of the music that you can create using Track mode and Song mode.

The Song mode edit screen allows you to create songs that consist of up to 100 linked **segments.** For each segment you can specify the sequence to be played, a tempo change, a delay, a pitch transposition, and the number of times the segment is to repeat. You can also specify program and/or volume changes on any or all of the 16 MIDI channels for each segment. Tempo, program and volume change entries are optional; if you do not specify a tempo change for a segment, it will play at the current tempo. No program or volume changes will be made by the program on channels for which they have not been specified. Sequences entered in Song mode should not contain PRIMARY, ST, XX, XL, MS, or US events, as these are ignored in Song mode.

Entering Segments

Song segments are entered into an event list that is similar to the one used in Track and Open modes. Although the headings are different, the procedure for entry and edit of individual segments is similar to that described in Chapter 4. As in the other modes, any of the edit options on the right side of the screen can be selected by clicking on that option, and songs can be selected with the select boxes in the lower right corner. The fields used in the Song mode event list are:

SEG: A number supplied by the program indicating the position of the segment in the list. SEG is used to specify a range of segments in the song when you are using the various edit options.

SEQ: The number (1 - 9, A - X, or 00 - 92) of the sequence to be played for the segment. Frequently, this will be the only entry that you need to make for a segment.

NAME: The name of the sequence to be played. This is supplied by the program, and cannot be changed in Song mode.

TEMPO: The tempo at which the segment is to be played. If this is omitted, the segment will play at the previously established tempo. Tempo changes will have no effect unless you are using the internal clock, though it is used in calculations when synchronizing to an external clock.

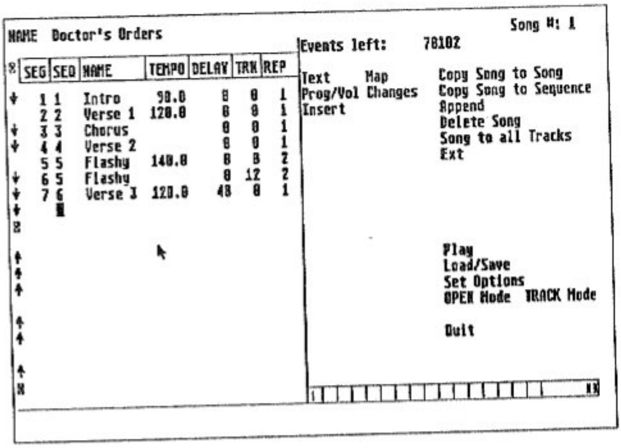
DELAY: The number of time steps that you wish the program to pause before playing the segment. Most of the time, you will probably not need to enter a DELAY.

TRN: The number of half steps that you wish the segment to be transposed in pitch. If a drum channel has been defined on the SET OPTIONS screen, notes on that channel will not be transposed.

REP: The number of times that you wish the segment to repeat. If you want the segment to play only once, you do not need to enter this field.

When you first enter Song mode, the edit screen will come up, and the cursor will be under SEQ on the first line. To enter a segment, type the desired sequence number, and any other fields that you wish to enter, and press RETURN. You can use the TAB and SHIFT-TAB keys to move forward and back along a line. The DELAY and TRN fields default to 0, and the REP field to 1, so if you want your sequence to play once with no delay, transposition, or tempo change, you need only enter the sequence number.

Here is a shot of the Song mode edit screen, with a representative song in the event list:



NAME Doctor's Orders

Song #: 1

Events left: 78102

SEG	SEQ	NAME	TEMPO	DELAY	TRK	REP
1	1	Intro	90.0	0	0	1
2	2	Verse 1	120.0	0	0	1
3	3	Chorus		0	0	1
4	4	Verse 2		0	0	1
5	5	Flashy	140.0	0	0	2
6	5	Flashy		0	12	2
7	6	Verse 3	120.0	48	0	1

Text
Map
Prog/Vol Changes
Insert
Copy Song to Song
Copy Song to Sequence
Append
Delete Song
Song to all Tracks
Ext
Play
Load/Save
Set Options
OPEN Mode
TRACK Mode
Quit

These seven segments illustrate all of the options available on the left side of the screen. The first segment entered was sequence 1, at a tempo of 90 BPM. If no tempo had been entered, the segment would play at the previously set tempo, shown at the bottom of the play screen. Tempo change events within the sequences themselves will change the tempo from that programmed on the Song mode edit screen.

The second segment plays sequence 2, with the tempo increased to 120. Sequences 3 and 4 are each played once at the same tempo. Sequence 5 is then played twice at a tempo of 140, and then twice again transposed up 12 half steps (an octave). Finally, sequence 6 plays at a tempo of 120. This segment does not start until 48 time steps (half a measure at the default setting) after the previous segment ends.

To play the song, click the right mouse button, and the Song mode play screen will come up. Click the right mouse button or press F1 to play the song. The Song mode play screen is described in detail in Chapter 8.

Editing Single Segments

Segments are edited using the same procedure used in the Track and Open mode edit screens. Move the edit cursor to the line that you wish to edit, and click the mouse. Type in any desired changes, and press RETURN, or press UNDO to cancel any changes. If you want to remove a tempo, repeat or delay specification, just type over it with blanks. You can delete an entire segment by pressing the DELETE key while the cursor is on the line you wish to delete.

If you want to add segments to a song, click under SEQ on the line below the last segment shown. If your song is more than a full screen long, you can use the scroll arrows to move up and down. A song can contain up to 100 segments.

Song Mode Edit Options

The Song mode edit options, on the right side of the screen, are selected by clicking the mouse as in the other modes. Most of the options are similar to corresponding options on the Open and Track mode edit screens, described in Chapter 4.

Name

The song name is 60 characters long, and stretches across the top of the screen. Clicking on NAME, or anywhere on the line, will move the cursor to this line. Type in the desired name and press RETURN.

Text and Map

The TEXT option provides access to the KCS's comment text area, and MAP displays information about every active track, sequence, and song. See Chapter 4 for more on these options.

Prog/Vol Changes

You can specify program and/or volume changes for any or all of the 16 MIDI channels to be sent before a segment is started. Move the edit cursor to the line containing the segment that you want to insert changes for, and then click the mouse on PROG/VOL CHANGES on the right side of the screen. An edit window with data fields for MIDI program and volume change commands on all 16 channels will appear. The segment number will be displayed at the top of the window.

Data is entered in the usual manner for edit windows. MIDI program and volume numbers range from 0 - 127, though not all instruments respond to MIDI volume changes, and most instruments do not use all 128 patch numbers. Different instruments also use different patch numbering systems. MIDI patch number 0 will, for example, call up patch 00 on an Oberheim Matrix 6, patch 1 on Yamaha instruments, preset 1 on a CZ-101, and patch 11 on Korg instruments. In general, when you have difficulties interfacing MIDI devices, the Doctor's prescription is REXMAN (Relax, EXperiment, and read your owner's MANuals).

The program and volume changes will be sent before the selected segment is played. No program or volume information will be sent for channels for which no data was entered.

Insert and Delete

Clicking on INSERT or pressing the INSERT key will open up a blank line, as in the other modes. Type in the new segments, pressing RETURN after each one, or UNDO after any mistakes. Click the mouse on a new line to cancel INSERT.

Pressing the DELETE key will delete the segment under the cursor.

Copy Song to Song and Copy Song To Sequence

COPY SONG TO SONG lets you copy the current song to the first unused song. COPY SONG TO SEQ lets you copy the segment list to an Open mode control sequence. Open mode control sequences, described in Chapter 4, provide a more general way to arrange your sequences into songs. If you decide that your song needs some more parts, you may want to use Copy Song to Seq to get the song into Open mode, and then add more parts using overdub or record with cue. Copying a song to a sequence is also a good starting point for understanding the structure of control sequences. You should remember that you cannot go the other way; there is no way to copy a control sequence to a song.

Append and Delete Song

You can append another song to the current song, or delete an unwanted song from memory by clicking on APPEND or DELETE SONG. Dialog boxes will prompt for the song to append or delete.

Song to All Tracks

Clicking on this option will delete all tracks currently in Track mode memory and place the current song in all tracks by copying each sequence used in the song to all tracks. This is useful for overdubbing solo parts or controllers over an entire song, but makes editing the song more difficult.

Since copying a song to all tracks requires quite a bit of the computer's memory for work space, it is possible that you may get an "out of memory" message when doing this with a long song.

Other Options

The remaining options on the Song mode edit screen are identical to the corresponding options in Open and Track modes. See Chapters 4, 10 and 11 for more details on PLAY, LOAD/SAVE, SET OPTIONS, OPEN MODE, TRACK MODE, and QUIT.

Chapter 6

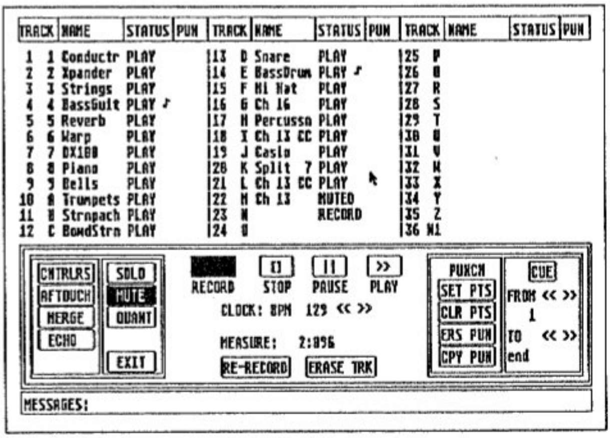
Track Mode Play/Record

The Track mode play/record screen of the KCS functions as a 48 track tape recorder, with all the controls usually found on a mechanical tape recorder, as well as many more that have no counterparts on the physical instrument. All aspects of recording and playback are controlled in real time from the play/record screen.

Track mode can be used in many different ways in composition. An entire piece can be recorded in Track mode, using tracks that run the whole length of the piece, or completed tracks can be moved to Open mode and linked with other tracks in Song mode, or in Open mode using control sequences.

Play/Record Screen

The Track mode play/record screen will appear whenever Track mode is entered from one of the other two modes, and when the program is first booted. The play/record screen looks like this:



TRACK	NAME	STATUS	PUN	TRACK	NAME	STATUS	PUN	TRACK	NAME	STATUS	PUN
1 1	Conductr	PLAY		13 D	Snare	PLAY		25 P			
2 2	Xpander	PLAY		14 E	BassDrum	PLAY ♪		26 Q			
3 3	Strings	PLAY		15 F	Hi Hat	PLAY		27 R			
4 4	BassGuit	PLAY ♪		16 G	Ch 16	PLAY		28 S			
5 5	Reverb	PLAY		17 H	Percussn	PLAY		29 T			
6 6	Warp	PLAY		18 I	Ch 13 CC	PLAY		30 U			
7 7	DX100	PLAY		19 J	Casio	PLAY		31 V			
8 8	Piano	PLAY		20 K	Split 7	PLAY		32 W			
9 9	Bells	PLAY		21 L	Ch 13 CC	PLAY		33 X			
10 A	Trumpets	PLAY		22 M	Ch 13	MUTED		34 Y			
11 B	Strnpach	PLAY		23 N		RECORD		35 Z			
12 C	BowdStrn	PLAY		24 O				36 N1			

CLOCK: BPM 129 << >>

MEASURE: 2:096

FROM << >> 1

TO << >> end

MESSAGES:

The screen is divided into three sections: the track status area, the control panel, and the message line. The **track status area**, in the upper portion of the screen, displays the play status of each of the first 36 tracks. Activity on any track is also shown in the track status area by a musical note icon, which changes color as notes occur on that track. The **control panel**, in the lower part of the screen, contains a number of buttons and indicators which mimic the operation of a tape recorder, and the **message line**, at the very bottom of the screen, displays messages relating to various controls that aren't shown on the control panel. All of the buttons on the control panel can be activated with the mouse, or from the computer's keyboard. In addition, there are a number of other controls which can be accessed only from the keyboard or the SET OPTIONS screen. Each control is described in detail later in this chapter.

Each track has two designations: its track number, which is a number from 1 - 48, and an associated track key, which is a single key on the computer keyboard. Tracks are selected either by pressing the appropriate track key, or by clicking on that track in the status area. Selecting a track is not used to determine which track to record on, since recording is always done on the lowest numbered free track, but to apply the currently selected track option to a track. The track options are used to mute or solo a track, as well as for other functions.

Recording in Track Mode

Recording starts when a note is played on the controller connected to the computer's MIDI in, when the PLAY button is clicked, or when the F10 key (or the SPACE bar) is pressed. As soon as recording starts, the visual metronome will start to flash, the audible metronome will start to beep, and the measure/step counter will start counting. Recording ends when the F10 key is pressed, or when the end of track 1 is reached, if track 1 has already been recorded. (The time at which recording stops is also affected by the ALIGN option, described later.) At this point, recording will start on the next available track, and continue until the end of track 1 is reached again. This process repeats until all 48 tracks are full, or until the sequencer is stopped. Recording can be turned on and off while the sequencer is running by clicking on the RECORD button or pressing F2, and all of the other controls can be changed during record or playback as well.

Track Options

The **track options** allow you to determine what will happen to a track when it is selected, either with the mouse or by pressing a track key. Only one track option can be active at a time. Some of the track options can be selected from the control panel or the keyboard, while others which are used less frequently can only be selected from the keyboard.

The default track option is MUTE. When MUTE is active, selecting a track will "silence" that track; the track can be unmuted by selecting it a second time, as long as the MUTE track option is active. Muting a track will cause that track's status display to change from PLAY to MUTE.

The other track options are SOLO, SET SWITCH, SET PUNCH, CLEAR/RESET PUNCH, ERASE PUNCH, COPY PUNCH, ERASE TRACK, SHIFT, SWAP, EDIT SELECT, and NAME. Each track option is described in detail later in this chapter.

Punch-In

Punching is used to replace a portion of an otherwise good track. The term "punching" is borrowed from multi track terminology, where it refers to re-recording a section of a track by punching the record button in at the start of the unwanted section and punching out at the end.

Punching on the KCS is a little different than punching on a tape deck. Instead of erasing the punched portion of a track, the track is simply muted for the duration of the punch, and new data is recorded on a new track. Once a good replacement track has been recorded, the original punched data can be erased and the two tracks merged. The details on punching can be found later in this chapter, in the section on the PUNCH buttons.

RECORD

The RECORD button on the control panel is used to turn recording on and off. This button will light up when recording is activated. Record can also be turned on or off with the F2 key.

STOP, PAUSE, and PLAY

Clicking on STOP will stop playback of all tracks, complete the current recording (if record is on), and reset the sequencer to the beginning of all tracks, or to the current cue point, if one is selected. The ENTER key duplicates this function.

Clicking on PAUSE or pressing the ESC key will temporarily stop the sequencer. Notes played on the keyboard will not be recorded when paused, though controllers may be recorded, depending on the setting of the CONTROLLER PAUSE switch on the SET OPTIONS screen. Clicking on PAUSE a second time will restart the sequencer.

PLAY starts the sequencer. If recording is enabled, recording will start when PLAY is selected. If a cue point has been set, playback or recording will start from that point. Playback can also be started with the F10 key, the SPACE bar, or the right mouse button.

CLOCK and MEASURE

The CLOCK display shows the current clock source, and the tempo of the internal clock. If MIDI is displayed next to CLOCK, then the external MIDI clock is in use. Otherwise, the internal clock tempo is shown in beats per minute (BPM).

Clicking on the >> or << symbols will increase or decrease the internal tempo by an amount set by the TEMPO CHANGE BY RATIO control, described under HIDDEN CONTROLS, below. Holding the mouse button down while the mouse pointer is on one of these symbols will cause a rapid change in tempo. Pressing the , and . keys (COMMA and PERIOD) will also change the tempo.

The MEASURE display shows the current location of the sequencer during record and playback, in measures and steps.

RE-RECORD, RE-RECORD STOP and ERASE TRK

Clicking on RE-RECORD or pressing UNDO will erase the current track. Normally, this option will stop the sequencer and set the measure/step counter to the beginning of the sequence (or current cue point). The automatic stop feature can be turned off from the SET OPTIONS screen by turning off the RE-RECORD STOP button. In this case, clicking on RE-RECORD will erase the current track, without affecting the sequencer's playback.

ERASE TRK causes the most recently recorded complete track to be erased, along with the current record track. This function is duplicated by the ? key. Be careful when using this button, as the sequencer will not ask you to confirm this selection before erasing these tracks!

Tracks can also be erased with the erase track option. When this option (which can only be selected with the CLR HOME key) is active, selecting a track will erase that track. A question will appear on the message line to confirm this choice. Answer "y" to erase the track, or "n" to keep the track. Select another track option, such as MUTE, to turn this option off.

CNTRLRS and AFTOUCH

These options are used to enable or disable the recording of MIDI controllers such as pitch bend, patch changes, and aftertouch. CNTRLRS affects all MIDI data except note data and aftertouch, and can also be toggled with the COLON (:) key. The AFTOUCH function is duplicated with the QUOTE (') key.

When recording controllers, if a pitch bend or sustain pedal (CC 64) event is recorded, a zero pitch bend and/or sustain pedal off event are placed at the end of the recording. This prevents hanging or mistuned notes if the affected sequence is looped or joined to another sequence, either in Open mode or by using the DOUBLE or APPEND options in Track mode. This is helpful in most circumstances, but you may need to edit these events out if you are recording a part that is to be spliced into an existing sequence.

QUANT

When this switch is on, any events recorded will be rounded to the nearest time interval represented by the musical icon below the QUANT switch. This is similar to the AUTO-CORRECT edit option, but also effects controller and other non-note data types as well, and cannot be undone. Only quantize values represented by the available note icons may be selected from the play/record screen, but any value desired may be entered from the SET OPTIONS window.

MERGE and ECHO

The MERGE and ECHO buttons toggle the MIDI merge and echo features. MIDI merge is used to mix data from the computer's MIDI in with data from the sequencer, for transmission through the MIDI out jack. This is necessary when using the KCS in conjunction with a master keyboard to control a set of expander modules.

ECHO is similar to MERGE, except that data is rechannelized prior to merging and/or recording. Clicking on ECHO causes a display of the current echo channel to appear beneath the ECHO button; clicking on the associated >> and << symbols will change the echo channel.

The functions of the MERGE and ECHO buttons are duplicated with the SEMICOLON (;) and BACKSPACE keys, respectively. When ECHO is active, the status of the MERGE switch is ignored.

MUTE, SOLO, and SET SWITCH

These three track options are used to selectively mute one or more tracks during playback. MUTE, which was described earlier in the section on track options, can also be activated with the F3 key.

A block of adjacent tracks can be muted or unmuted by holding down the left mouse button and dragging the mouse over those tracks. The status of each track will toggle as the mouse passes over it.

The MUTE function can also be modified using the SHIFT and ALTERNATE keys in conjunction with the mouse. If ALTERNATE is held down while MUTE is active and a track is selected with the mouse, that track will be muted if it is playing, but will not be unmuted if it is already muted. Conversely, holding down SHIFT while selecting a track with the mouse will unmute any muted tracks, but will not mute tracks. (Think of the ALTERNATE and SHIFT keys as meaning "mute only" and "unmute only", respectively.)

The SOLO track option is used to solo a track, that is, mute all tracks except the selected track. Selecting the track a second time will unmute the other tracks. SOLO can also be selected by pressing F8.

SET SWITCH is used to set up a "switch" which will alternately mute and unmute two selected tracks. Selecting a track after this option is chosen will change that track's status to SWITCH; selecting a second track will change the first track's status to PLAY and the second track's to MUTE. The RETURN key can then be used to alternately switch between the two tracks. After the second track is selected, the track option will automatically change to MUTE. The SET SWITCH option can only be selected with the F9 key, and not from the control panel.

Note that muting a track which contains OFF events (which are only recorded for notes with release velocity or for notes greater than 999 steps long) could cause some notes to stick. Stopping the sequencer, or pressing the ˜ (SHIFT-ACCENT) key, will clear any stuck notes.

EXIT and Help

Clicking on EXIT or pressing F1 will stop the sequencer and transfer you to the Track mode edit screen. Pressing the HELP key will stop the sequencer and display a list of the Track mode keyboard commands. These commands are also listed in the TRACK MODE COMMAND REFERENCE LISTS at the end of this manual.

PUNCH

The buttons under PUNCH are used to access the sequencer's punch in and out capabilities. The punch buttons are all track options, so only one can be selected at a time, and selecting any other track option will deselect the punch buttons.

SET PTS is used to set the start and stop points for a punch. The F4 key duplicates this function. When this track option is active, selecting a track will set the start point for the punch; the track will also be muted and *** will appear in the status display under PUN. Selecting the track a second time will set the end point for the punch, and the track will be unmuted and the word ON will appear under PUN. If the track is not selected again before the track loops, the end punch point will default to the end of the track. As the track loops, the display under PUN will change from ON to OUT when the punched out section is playing, and back again when the end punch point is reached.

If punch points have already been set for a track, then selecting that track will change either the start or end point of the punch. Selecting a track while that track is punched OUT will change the end punch point, and selecting the track while it is on will set a new start point. Each track can only have one set of punch points, but separate punch points can be set for as many tracks as needed.

The clear punch points track option is selected by clicking on CLR PTS, or by pressing F5. Selecting a track while this option is active will temporarily remove the punch points in that track, and unmute the punched section. Click the mouse a second time to restore the punch points.

Clicking on ERS PUN or pressing F6 selects the erase punch option. Selecting a track while this option is active erases the punched section of that track and optionally merges the most recently recorded track with the original. When a track is selected, a prompt asking for one of three keys to be pressed will appear on the message line. Press Y to erase the punched data, L to erase the punched data and merge the track with the last track recorded (thereby replacing the punched data), or N to cancel the command.

CPY PUN or the F7 key will select the copy punch track option. Selecting a track with active punch points will copy the punched data to the next empty track, and delete that data from the original track. The new track will also be muted.

CUE

The CUE button is used to activate Track mode's cue loop. When CUE is on, the sequencer will repeatedly loop the material contained between the start (FROM) and end (TO) points of the cue loop. Clicking on CUE will immediately start all tracks at the beginning of the cue loop; clicking on PLAY when the CUE button is lit has the same effect. The TAB key can also be used to activate the cue loop, and the SLASH (/) key will turn cueing off.

The start and stop points for the cue loop can be changed in a number of ways. With the mouse, clicking on the >> and << symbols will move either cue point forward or backward. These controls are duplicated on the computer keyboard by the cursor control keys, with the CURSOR UP and CURSOR DOWN keys controlling the start point, and the CURSOR LEFT and CURSOR RIGHT keys affecting the end point.

The amount the cue points move each time one of these buttons is pressed can be changed with the INSERT key. Normally, the cue point move amount is one measure; pressing the INSERT key changes this to eight measures, and pressing it again will change it back to one measure.

The last one, two, four, or eight measures played can be replayed by pressing the LEFT BRACKET ([), RIGHT BRACKET (]), ACCENT(`), and EQUAL (=) keys, respectively. Pressing one of these keys will move the cue point back by the appropriate amount and start the sequencer at that point, though the cue loop will not be activated. These buttons are handy if you hear a mistake or other point of interest while listening to the tracks, and want to hear it again.

Cueing can be used for recording as well as playback. When a new track is recorded with the cue loop active, the program adds time to the beginning of that track to align it to the other tracks.

If the start point for the cue loop has been changed since the last time the cue was played, there may be a slight delay between loops as the sequencer advances to the start of the loop.

Track Merge

Pressing the BACKSLASH (\) key, just to the right of RETURN, selects the Track merge option. This is used to combine two or more tracks into a single track, which can simplify the editing of tracks that are on the same MIDI channel, and frees up tracks for further recording.

When this option is selected, the message line will prompt you for a list of tracks to be merged; select the tracks with the mouse or the track keys, and press RETURN. Each track in the list will be merged with the lowest track, and then erased.

ALIGN

IN 3.5
ONLY ALIGN
IN:
EVIRONMENT/
FULL ENVIRONMENT/
ALIGN
WORKS
LIKE
THIS
& MUST STOP
Recording using
"SPACE" NOT Transport stop.

The sequencer's ALIGN feature is used during recording to force the length of track 1 to a whole number of measures. If ALIGN is off while recording track 1, recording stops as soon as the sequencer is stopped, so the last measure of the track may be less than 96 steps (or whatever the current measure length is), and the sequencer will loop unevenly. When ALIGN is on, the sequencer will continue to record to the beginning of the next measure after recording is stopped. ALIGN is turned on and off with the DELETE key.

Since track 1 sets the length of all tracks, ALIGN has no effect when recording tracks other than track 1.

Hidden Controls

There are a number of other controls which can only be accessed from the keyboard. Most can also be set from the SET OPTIONS screen, which can be reached directly from the play/record screen by pressing 0 (ZERO) on the computer's typewriter keyboard. See the SET OPTIONS chapter for more on these controls. The HELP key and this manual's Appendix also list the hidden control keys.

When a hidden control is changed from the play/record screen, a message confirming the change will appear on the message line. Hidden controls can be changed while the sequencer is playing or recording.

AUTO-RECORD is selected with the | (SHIFT-BACKSLASH) key. When this switch is turned off, the RECORD switch will turn off when it finishes recording a track. AUTO-RECORD is normally on.

The visible metronome can be turned on or off with the $ (SHIFT-4) key, and the audible metronome is toggled with the % (SHIFT-5) key. The & (SHIFT-7) key disables the step display in the measure/step counter.

Track looping is turned on or off with the ((LEFT PARENTHESIS) key, and FILTER is toggled with the) (RIGHT PARENTHESIS) key. The filter channel is changed with the PLUS (SHIFT-EQUAL) and UNDERSCORE (SHIFT-MINUS) keys. SILENT PUNCH is turned on or off with the MINUS (-) key. TEMPO CHANGE BY RATIO is toggled between one BPM and 2.5% by pressing the ^ (SHIFT-6) key.

A few hidden controls are not duplicated on the SET OPTIONS screen. The PANIC BUTTON (the ~ key, or SHIFT-ACCENT) sends an All Notes Off message on all 16 MIDI channels, as well as sustain pedal off and zero pitch bend messages for the appropriate channels. Pressing # (SHIFT-3) will mute all tracks, and pressing @ (SHIFT-2) will unmute all tracks, regardless of their current statuses. Finally, the ! (SHIFT-1) key brings up the ALL TRACKS TO SEQ edit window, which is described in detail in Chapter 4.

Track Shift, Swap, and Name

Function keys F11 through F16 are used to select the SHIFT track options. The SHIFT options are used to shift a track forward or backward in time, relative to the other tracks. The shift amounts are +1, +3, +12, -1, -3, and -12 for keys F11 - F16. (Remember, function keys F11 to F20 are selected by pressing SHIFT and a function key from F1 to F10.)

The DELETE key can be used to toggle between a positive and negative shift amount when a SHIFT option is active. Note that since the DELETE key is normally used to toggle ALIGN, the ALIGN feature can not be changed when a SHIFT option is active.

The program cannot shift a track if its first event would be placed before the start of the track, which means that negative SHIFT values cannot be used on tracks which start on the first beat. Nor will events shifted beyond the end of track 1 be played. Shifting a track changes the TIME value of the first event in the track by adding or subtracting the shift amount, and this change will be reflected in the event list on the edit screen. The TIME value for the first event of the track will be displayed in the right part of the message line whenever a SHIFT operation is performed.

You should be careful to turn SHIFT off by clicking on the MUTE button when you are done shifting tracks, as we have found that it is easy to accidentally mess up a track by shifting it when you really want to mute it.

SWAP is activated by pressing F18. The SWAP track option is used to swap the position of two tracks in the track display. Since notes on the lower numbered tracks are played before notes on the higher tracks, swapping tracks can be used to correct for minor timing problems caused by MIDI bandwidth limitations or differences in instrument response times. See Chapter 13 for more on sequencer timing.

When the NAME track option is selected with the F20 key, selecting a track will allow you to enter a name for that track. The input from the keyboard is not parsed (interpreted) as it is entered, so the BACKSPACE, DELETE, and similar keys will insert funky graphics symbols in the name, rather than performing the expected operations. Typing mistakes can be corrected from the edit screen.

MIDI Song Pointer

If a MIDI song pointer message is received while in Track mode, the program will start all tracks from the specified point. Song pointer messages will be ignored if the clock source, on the SET OPTIONS screen, is not set to MIDI WITH SONG POINTER. The correct time value will be inserted at the beginning of any track that is recorded after a song pointer message is received.

Song pointer is sent by the sequencer at the beginning of the cue loop, if cueing is activated and if SONG POINTER SEND has been enabled, as described in Chapter 11.

Countin

If a countin has been set on the SET OPTIONS screen, the program will wait for the programmed number of steps before starting to play or record. For example, a value of 96 will create a one measure countin. The metronome will sound and MIDI clock will be sent during the countin.

Velocity Pedal

The velocity pedal feature of the KCS allows you to modify the note on velocities of a part being recorded with a continuous controller. This can be used, for example, to play accents on synths which recognize velocity but don't send it, or to do a MIDI mixdown on a synth which recognizes velocity but not volume control. In conjunction with the live edit feature described later in this chapter or the loopback recording technique discussed in Chapter 13, the velocity pedal can be used to affect velocities of previously recorded tracks or sequences as well.

When velocity pedal is active, all continuous controllers on the velocity pedal channel (which is set from the SET OPTIONS screen only) will be combined with the note velocities of the incoming MIDI data in one of three ways. The three velocity pedal modes are selected with the F19 (SHIFT-F9) key, which is also used to turn the velocity pedal on or off. When the velocity pedal is on, control changes on the velocity pedal channel are not recorded or merged by the program. Pitch bend and aftertouch are not used for the velocity pedal.

Pressing F19 once selects the FULL velocity pedal mode, where the note on velocities are simply replaced with the last controller value received. FULL is most useful when recording a part from a non-velocity sensitive keyboard, which is played on a velocity sensitive slave. A mod wheel or foot pedal can be used to set the note velocity between 1 and 127, regardless of how hard you strike the keys.

MIX averages the last controller value received with the velocity of the note. This is most useful for making minor changes in a previously recorded track using live edit or loopback recording.

SCALE combines the last controller value and the note velocities in such a way that the controller has more effect at the top and bottom of its range, but very little near the middle. For example, if the controller is at or near 1, the recorded velocities will be at or near 1, no matter how hard the keys are struck. If the controller is at or near 127, the recorded velocities will be at or near 127. BUT, if the controller is near 64 (the center of its range), the recorded velocities will be determined mostly by the note velocities sent by the keyboard. SCALE is best suited to major editing on prerecorded tracks or sequences, using live edit or loopback recording.

Note that the velocity pedal channel, on the SET OPTIONS screen, need not be set to the channel that the keyboard or receiving synth is on, but must be set to the channel of the device with the continuous controller being used.

Live Edit

Live edit is an advanced feature of the Keyboard Controlled Sequencer which allows you to delete notes from a track or alter their velocities in real time, as the sequencer is playing. Since live edit is much more complicated than the other features of Track mode, we recommend that you become thoroughly familiar with the rest of the KCS before diving into live editing.

Live edit is activated by selecting the EDIT SELECT track option with the F17 (SHIFT-F7) key. When this option is selected, the words EDIT SELECT will appear in the message line, and the PUNCH buttons will be replaced with a set of EDIT buttons. The edit buttons are used to handle backup tracks and to turn live editing off, and the ALTERNATE, CONTROL, and LEFT and RIGHT SHIFT keys are used to edit the selected track.

When a track is selected, the word EDIT will appear in its status display, and a backup track will be created in the first available track. The track can now be edited with the keys mentioned earlier.

RIGHT SHIFT will delete notes that play while it is held down, by replacing them with DE events.

ALTERNATE will replace note velocities with velocity value Y from the step time record screen, which defaults to 127. If one of the three velocity pedal options is selected, pressing ALTERNATE will set the note velocities from the velocity pedal.

LEFT SHIFT will replace note velocities with step time velocity value W (default 64).

ALTERNATE plus LEFT SHIFT will replace note velocities with step time velocity value U (default 16).

CONTROL will replace notes in the edit track with notes from the backup track. Normally, this acts as an "undo" command, but can also be used as a compositional device if the backup track is changed from the edit screen. For instance, if the backup is transposed up an octave, then pressing CONTROL will have the effect of transposing notes up an octave when it is pressed.

The edit buttons are used to manage the current edit track's backup track, and to disable or exit from live edit. Clicking on an edit button will affect only the currently selected edit track.

The BACKUP button will replace the backup track with the edited track. Use this only when you are satisfied with any editing you have done, and be careful, as the original track will be lost when this button is pressed.

RESTORE is the opposite of BACKUP. It replaces the edit track with its backup track. Use this when you make catastrophic mistakes in your editing.

DONE changes the status of the track from EDIT to PLAY, and turns off live editing for that track. The backup track can be deleted as well, if desired.

Clicking on DONE again will replace the edit buttons with the punch buttons; pressing the * (SHIFT-8) key has the same effect.

OFF temporarily disables the editing keys, without turning live edit off. This allows you to select functions which require the SHIFT keys, such as velocity pedal or certain track options. Note that OFF doesn't turn live editing off - that is done with the DONE button.

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Chapter 7

Open Mode Play/Record

Open mode is the Keyboard Controlled Sequencer's generalized sequencing mode. In Open mode, you can define up to 128 independent sequences, any number of which may be played back simultaneously. These may be completely independent of each other, or some sequences may include commands to start and stop other sequences. A sequence which starts or stops another sequence is called a **control sequence**. By chaining control sequences together, you can realize very complex pieces of music. Chapter 4 describes how you can create control sequences using the edit screen.

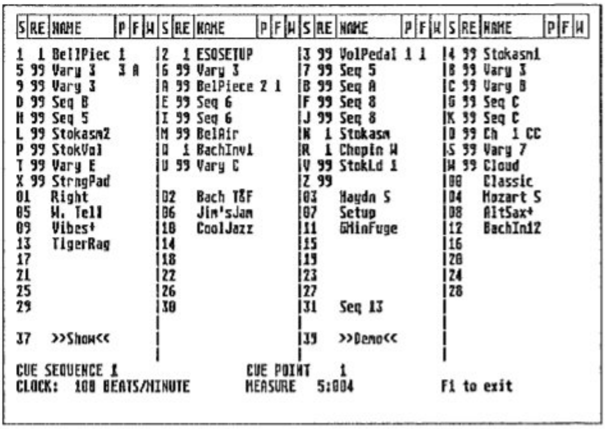
There are two types of sequences: **primary** and **secondary**. Primary sequences are designated by the numbers 1 - 9 and the letters A - Z, and are activated from the Open mode play screen by pressing the corresponding key on the typewriter keyboard. Secondary sequences are designated by the two digit numbers 00 - 92. They are activated from the Open mode play screen by typing two digits on the numeric keypad on the right side of the computer keyboard.

Play/Record Screen

Entering Open mode from either the Track or Song mode edit screens will place you on the Open mode edit screen. The play/record screen is entered by double clicking the right mouse button, by clicking on PLAY and selecting GO TO PLAY SCREEN, or by single clicking the right mouse button while holding down the SHIFT key. The program uses the same screen for both play and record operations.

An important difference between Open mode and Track mode is that going to the Open mode play screen does not automatically allow you to record. To record in Open mode, you must either select the RECORD option from the edit screen, or activate Open mode real time recording from the play screen. This procedure is described in detail later in this chapter.

The Open mode play/record screen looks like this:



```
|S|RE|NAME      |P|F|W|S|RE|NAME      |P|F|W|S|RE|NAME      |P|F|W|S|RE|NAME      |P|F|W|

1  1 BellPiec 1     |2  1 ESQSETUP      |3 99 VolPedal 1 1  |4 99 Stokasm1
5 99 Vary 3   3 A   |6 99 Vary 3        |7 99 Seq 5         |8 99 Vary 3
9 99 Vary 3         |A 99 BelPiece 2 1  |B 99 Seq A         |C 99 Vary B
D 99 Seq B          |E 99 Seq 6         |F 99 Seq 8         |G 99 Seq C
H 99 Seq 5          |I 99 Seq 6         |J 99 Seq 8         |K 99 Seq C
L 99 Stokasm2       |M 99 BelAir        |N  1 Stokasm       |O 99 Ch  1 CC
P 99 StokVol        |Q  1 BachInv1      |R  1 Chopin W      |S 99 Vary 7
T 99 Vary E         |U 99 Vary C        |V 99 StokLd 1      |W 99 Cloud
X 99 StrngPad       |                   |Z 99               |00    Classic
01   Right          |02   Bach T&F      |03   Haydn S       |04    Mozart S
05   W. Tell        |06   Jim'sJam      |07   Setup         |08    AltSax+
09   Vibes+         |10   CoolJazz      |11   GMinFuge      |12    BachIn12
13   TigerRag       |14                 |15                 |16
17                  |18                 |19                 |20
21                  |22                 |23                 |24
25                  |26                 |27                 |28
29                  |30                 |31   Seq 13        |
                    |                   |                   |
37   >>Show<<       |                   |39   >>Demo<<      |
                    |                   |                   |
CUE SEQUENCE 1                    CUE POINT    1
CLOCK:  108 BEATS/MINUTE          MEASURE   5:004            F1 to exit
```

The play screen consists of two areas; the **sequence area** at the top, and the **status lines** at the bottom of the screen. The sequence area shows the status of the 35 primary sequences and the first 45 secondary sequences. (The remaining secondary sequences can be played from this screen as well, but no status information is shown for these sequences.) Four consecutive sequences are displayed on each line. The P, F, and W columns contain information concerning the status of each sequence. The S (Sequence) column contains the designator for each of the 80 sequences displayed. The RE (REpeats) column shows the number of repeats programmed for each sequence. A 99 in the RE column means that the sequence will loop indefinitely. NAME shows the name of each sequence. The P (Play) column shows the number of times each sequence has left to play, and counts down as each repetition of the sequence occurs. A 9 will be displayed in the P column if that sequence has nine or more repeats left to play. The F (From) column contains the letter or number of the control sequence that started the sequence. This field is blank if the sequence was started from the computer keyboard. A W in the W (Wait) column indicates that the sequence is currently waiting for another sequence to finish, and an M means the sequence is currently muted.

The status lines at the bottom of the screen display information about various record and play options, and also show the measure/step counter, the real time clock, and the clock source or tempo. The words RECORD, CUE, MIDI MERGE, PAUSE, etc. will appear on the status lines when these features are activated, and disappear from the status lines when they are de-activated. The current cue point and cue sequence are also shown.

CLOCK, Metronome and Measure/Step Display

The current clock source is displayed next to the word CLOCK on the next to last line. This will be the current clock rate in beats/minute if the internal clock is being used, MIDI if MIDI clock is being used without song pointer, or MIDI WITH SP if MIDI clock is being used with song pointer.

If the internal clock is in use, the clock rate can be changed during play by using the COMMA (,) key to increase the tempo, or the PERIOD (.) key to decrease the tempo. The clock rate can also be changed from within a sequence using TM, AC, or DC events, or from the SET OPTIONS screen, described in Chapter 11. The SET OPTIONS screen is the only way to change the clock source.

The measure/step counter displays the current measure and step being played. It will be reset to measure 1 if you press UNDO to stop all sequences or CLR HOME to erase the current recording. It will be set to the cue or song pointer location if you start a cue or a song pointer message is received.

The program provides both a visible and an audible metronome. The visible metronome appears in the bottom right hand corner of the screen. The audible metronome can be heard through the speaker of your monitor. The separation between metronome clicks can be programmed from the SET OPTIONS screen.

Playing Sequences

Primary sequences 1 - 9 and A - X are started by pressing a key on the typewriter keyboard, and secondary sequences 00 - 92 can be started by typing a two digit number on the numeric keypad. (Primary sequence 1 - 9 cannot be started from the numeric keyboard, nor can secondary sequences be started from the typewriter keyboard.) If ALIGN is turned off, the sequence will start immediately; otherwise it will wait for the beginning of the next measure and then start.

The numeric keypad also has a "bank lock" feature, which allows selecting any secondary sequence from within a bank of ten sequences using a single key. Pressing the ASTERISK (*) key on the numeric keypad after entering one or both digits of a secondary sequence will lock the 10's place (the first digit) of that number, and subsequent numeric keypad digits will immediately start the appropriate sequence in the bank. For example, pressing * on the numeric keypad after pressing 1 will lock the 1 in as the first digit of the secondary sequence, and pressing numeric keys 2, 3, and 4 will start sequences 12, 13, and 14. Bank lock is turned off with the ((LEFT PARENTHESIS) key on the numeric keypad. The most recently started secondary sequence is displayed in the lower right corner of the screen, which is helpful when you are using the bank lock feature, and the word BANK will appear beside the sequence number if bank lock is turned on.

Normally, the sequence will play for the programmed number of repeats and stop. To stop a sequence from looping, press the appropriate sequence key or numeric keypad number once. The sequence will play to the end and then stop. To stop a sequence immediately, press the sequence key or number twice if it is looping, or once if it is in its last play. To play several sequences at once, press the ESC key to put the program into pause, start the sequences, then press ESC again.

Muting Primary Sequences

To mute any primary sequence that is playing, press SHIFT and the sequence key simultaneously. An M will appear under the W heading for the sequence. The sequence will continue to keep time, but no events will be sounded. Notes currently playing will be shut off unless they were defined with separate ON and OFF events. Such notes will stick until F1, UNDO, or the PANIC BUTTON is pressed.

To unmute a sequence, press the sequence key again (no SHIFT this time). The M will disappear and the sequence will resume sounding at the same point it would have been at, had the mute feature not been invoked. Use mute to cue in and out multiple overdubs in real time, or to isolate and listen to individual sequences.

Secondary sequences cannot be muted from the Open mode play screen, though they can be muted and unmuted with MS and US events.

Cancel

Pressing the UNDO key will cancel, or stop, all active sequences, and set the measure counter to 0. If you are currently recording, it will erase the recorded sequence and allow you to start recording again. Cancel will not erase a sequence which you recorded earlier in the current play/record session.

Pause

The ESC key can be used as a pause button during playback or record. Pressing ESC shuts off any notes being played and stops the internal clock, or if MIDI clock is being used, all clocks will be ignored until the pause button is pressed again. The word PAUSE is displayed on the middle status line until it is deactivated or you leave the play/record screen.

Notes played on the keyboard are not recorded when paused, but the last controller of each type played is recorded, if the CONTROLLER PAUSE switch is active on the SET OPTIONS screen. See Chapter 11 for more details.

Cueing

The TAB key activates the cue feature. Each time you press the TAB key the cue sequence will begin playing from the cue point. Program changes that occur earlier in the cue sequence will be sent over MIDI, and sequence start events and tempo changes will be executed.

The cue sequence is set from the play options dialog box, described in Chapter 4. It can also be changed from the play/record screen by using the left and right cursor control keys. The CURSOR LEFT key decreases the cue sequence by one, and the CURSOR RIGHT key increases the cue sequence by one.

The cue point determines where playback will begin in the cue sequence. This also can be set from the play options dialog box, and changed from the play/record screen using the CURSOR UP and CURSOR DOWN keys and the INSERT key. The up arrow moves the cue point higher, the down arrow moves the cue point lower, and INSERT toggles the amount that the cue point moves between one measure and eight measures.

The cue feature is particularly useful when the cue sequence is a control sequence that plays an entire piece. You can use cue to hear the piece starting from any point. By keeping alternate arrangements of your songs on consecutive sequence keys, you can quickly go back and forth between the same point of different arrangements of a piece with the cursor keys.

Align

When activated, ALIGN forces the program to wait till the end of a measure before exiting the record mode. This assures that all sequences recorded will loop properly. ALIGN also forces all sequences that are started from the computer keyboard to wait until the beginning of the next measure before playing.

ALIGN is normally on when recording, and off when in play and not recording. It can be toggled on or off with the DELETE key.

MIDI Merge

MIDI MERGE is activated by pressing the SEMICOLON (;) key. All incoming MIDI data, including system exclusive messages, received by the computer is merged with the sequence data being played. Press the ; key again to de-activate MIDI merging. MIDI merging is disabled when ECHO is on.

Echo

The ECHO feature is used to rechannelize MIDI data recorded by the program and send it out the computer's MIDI out. This allows you to record on any channel while using a keyboard controller that transmits on a single channel. If ECHO is active, the word ECHO will appear on the bottom of the screen, followed by the echo channel. You can use the BACKSPACE key to toggle echoing on and off from the play/record screen, and use the > and < (SHIFT-PERIOD and SHIFT-COMMA) keys to increase or decrease the echo channel.

Filter

FILTER is used to force the sequencer to accept MIDI data on only one channel, the filter channel. Incoming data on other channels is ignored. FILTER is turned on with the) (RIGHT PARENTHESIS) key, and the filter channel can be lowered or raised with the UNDERSCORE (SHIFT-MINUS) or PLUS (+) keys, respectively.

Set Options and Help

The SET OPTIONS screen can be reached directly from the Open mode play screen by pressing the 0 (ZERO) key. The SET OPTIONS screen is described in Chapter 11.

Pressing the HELP key will bring up the Open mode help screen, which shows the functions of each key on the computer keyboard in Open mode. These functions are also summarized in the Appendix to this manual.

Exit

Pressing F1 will immediately end the play/record process and take you directly to the edit screen. The left mouse button duplicates this function in Open mode.

Panic Button

Pressing the ˜ (SHIFT-ACCENT) key will send All Notes Off messages on all 16 MIDI channels. This is useful for canceling stuck notes on any synthesizers that, for one reason or another, did not receive a note off message. The All Notes Off message is not recognized by all instruments, so this button may not always clear all stuck notes. The panic button also clears any sustain pedal or pitch bend settings that may have been left "hanging".

Recording in Open Mode

Open mode recording can be selected in one of two ways. Clicking on RECORD from the Open mode edit screen will bring up an edit window which allows you to select one of four recording methods, or pressing the RETURN or ENTER keys on the Open mode play screen will enable real time recording. Generally speaking, selecting RECORD from the edit screen provides more flexibility in recording, while the RETURN/ENTER method is more convenient if you are playing an Open mode sequence and want to record a part whenever inspiration strikes. Real time recording is described later in the chapter.

When you select RECORD from the edit screen, an edit window will ask which sequence you want to record, and will also present a set of record options. The sequence will default to the next empty sequence, or you can enter a sequence. Enter one key for a primary sequence or two digits for a secondary sequence. Remember that sequences Y and Z are reserved for internal use by the program and cannot be recorded.

Four record options are displayed in the left part of the edit window, one of which must be selected. STEP TIME allows you to create a sequence using a method similar to step mode entry on a drum machine. Step time entry is useful for entering fast arpeggios, regular chord patterns or other parts with few changes in note to note timing. The step time recording process is described in detail in Chapter 9.

REAL TIME records events from the synthesizer keyboard in real time. In this mode the program is similar to a tape recorder, recording all notes as you play. OVERDUB will automatically play the overdub sequence and set the length of the current sequence to match that of the sequence you are overdubbing to. You must select an existing sequence to overdub to if you choose OVERDUB. RECORD WITH CUE is another way to record a new sequence in sync with an existing sequence. RECORD WITH CUE differs from OVERDUB in that the existing sequence may be started at any measure. It is particularly useful when the existing sequence is a partly completed song that you want to add parts to in specific places. You must select an existing sequence to be the cue sequence. The real time record options are described in detail later in this chapter.

Controllers, Aftertouch, Note Off Vel, and Echo

These record options set the sequencer to record or ignore MIDI controllers, aftertouch, and note off (release) velocity. CONTROLLERS enables the recording of pitch bend, control changes, and program changes. If a pitch bend or sustain pedal (MIDI controller 64) event is recorded, a zero pitch bend or sustain pedal off message will be placed at the end of the recording. AFTERTOUCH controls the recording of aftertouch (pressure) information. Since aftertouch and controller data use such large chunks of memory, it is best to disable CONTROLLERS and AFTERTOUCH unless specifically required.

NOTE OFF VEL allows separate storage of note off events, including note off velocity. There are only a few synths capable of sending and receiving note off velocity. Notes recorded with note off velocity are stored as separate note on and note off events, and are more difficult to edit. The KCS can only remember to hold down 64 notes (on all synths) at one time using ON events, so if you need more than that, you need to record some parts with note off velocity.

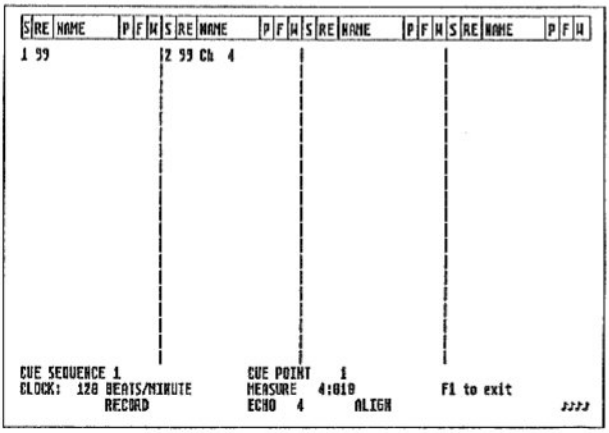
The letters C A O will appear beside RECORD on the play/record screen if any of these options are turned on. The options can also be turned on and off directly from the play/record screen. The COLON (:) key toggles controllers, the QUOTE (') key aftertouch, and the DOUBLE QUOTE (") key note off velocity.

ECHO can also be toggled from this window. ECHO is described earlier in this chapter.

Real Time Record

If you select the REAL TIME, OVERDUB, or RECORD WITH CUE options, the play/record screen will be displayed. The only visible differences between play and record are that the words RECORD and ALIGN appear at the bottom of the screen along with any other active record options.

The following example shows the screen that would appear if your first action in Open mode is to record sequence 2, echoing onto channel 4. The number of the sequence being recorded is shown in red on a color monitor.



```
S|RE|NAME     |P|F|W|S|RE|NAME     |P|F|W|S|RE|NAME     |P|F|W|S|RE|NAME     |P|F|W
1 99              |2 99 Ch  4         |                    |

CUE SEQUENCE 1                 CUE POINT    1
CLOCK:  128 BEATS/MINUTE       MEASURE   4:010            F1 to exit
            RECORD             ECHO   4       ALIGN                   ♪♪♪♪
```

When you begin playing on the synth keyboard, the metronome (bottom right of screen) will begin flashing and the measure/step counter will start counting up. A metronome will also sound on your monitor speaker. If you did not specify a name, the MIDI channel of the first event recorded will be displayed under NAME. If you want to begin the sequence with a rest, press the F10 key.

If, during recording, you make a mistake and wish to start again, press the UNDO key. The current recording will be erased and the program will start recording again when you play the keyboard or press F10. When you have finished recording press F10 and the sequence will begin playing back immediately if ALIGN is off, or when the measure completes if ALIGN is on.

If your new sequence is playing back and you decide you don't like it, you can erase it and record again by pressing CLR HOME. Recording will start again when you play the keyboard or press F10. Press F10 a second time to end recording and hear what you just played.

All of the play features described earlier in this chapter also function when recording. To stop recording and go to the edit screen, press F1.

As mentioned earlier, real time recording can also be selected directly from the Open mode play screen by pressing the RETURN or ENTER key. If RETURN is pressed, recording will start as soon as a note on or other relevant MIDI event is received at the MIDI in jack, and if ENTER is pressed, recording begins immediately. The first unused sequence will be used for recording. Pressing F10 will turn recording off and play the newly recorded sequence, pressing UNDO will erase the current recording and stop all sequences, and the CLR HOME key will erase the last sequence recorded in the current session.

Additional Open mode sequences can be recorded in a single real time recording session by pressing either RETURN or ENTER, even if recording was initiated from the edit screen. This process can be repeated as many times as needed, to record additional sequences.

Overdub

The OVERDUB option allows you to record a new sequence in sync with an existing sequence called the **overdub sequence** which is automatically played back by the program as you record. You can start the overdub process by playing a note on your synth or by pressing F10. In either case, the overdub sequence will automatically be started and recording will begin.

When the overdub sequence completes, the program will automatically end the recording process and play back both sequences together. If you make a mistake during recording or are dissatisfied after the recording, you can use the UNDO or CLR HOME keys to start over, as described above under REAL TIME RECORD.

Since the overdub sequence can be any Open mode sequence, including a control sequence, it is possible to overdub a sequence to a section of a song, or an entire piece. Overdubbing to a control sequence is done in the same manner as overdubbing to any other sequence.

If you start the overdub sequence with F10 and don't play any notes at all before it ends, the overdub sequence will still loop, and the program will remain in record. This allows you to listen to your overdub sequence a few times before recording.

Record with Cue

RECORD WITH CUE is very similar to OVERDUB, but allows you to start the overdub sequence at any measure. This is useful for things like adding tom fills to a section, adding some grace notes to a long piano sequence, or adding controllers to a piece after the basic arrangement is done. The program will automatically insert the correct amount of time before the first event.

When the RECORD OPTIONS edit window is displayed, select RECORD WITH CUE and then click the mouse to OVERDUB/CUE SEQ, and enter a sequence key or number. If you select an unused sequence, the program will alert you. You can also set a new cue point at this time. This will be the measure at which the program will start the cue sequence.

When you get to the play/record screen the cue sequence and cue point displays will reflect the values you entered. Play a note or press F10 to start recording. The cue sequence will begin playing at the specified cue point. Press F10 when you have completed recording. Both the cue sequence and sequence you recorded will start playing back from the specified cue point. You can restart both sequences at any later time by pressing F10 or TAB. If you make mistakes and want to start over, you can press UNDO if you are still recording or CLR HOME if you have completed recording. The program will erase your recording and return to the beginning of the recording procedure.

Recording with Velocity Pedal

When the VELOCITY PEDAL option has been activated from the SET OPTIONS or Track mode record screens, the sequencer will not directly record note on velocities, but will instead record values based on the position of any continuous controllers on the velocity pedal channel. The velocity pedal function cannot be accessed from the Open mode play/record screen. See the chapter on the Track mode play/record screen for more information on the velocity pedal.

Recording with a Countin

You can use the SET OPTIONS screen to set a recording countin. This allows you to use the metronome or an external MIDI drum machine to get the feel for a few beats before recording. If you are using a countin, press F10 when you are ready to record or overdub. The program will sound the metronome and send MIDI clock, but it will not start recording or start the overdub sequence until the number of steps specified for the countin have passed.

MIDI Song Pointer

If the MIDI W SONG POINTER clock source option was selected from the SET OPTIONS screen, and the program receives a MIDI song pointer message during Open mode play, the program will turn off all active sequences, and start the current cue sequence at the point specified by the song pointer message. The only MIDI events that will be sent while the program is chasing the song pointer are program changes. It may take a few seconds for the program to chase many measures into a complex piece, and songs with a lot of continuous controller data will take a little longer than other songs.

Recording with song pointer is similar to recording with cue. If the clock source has been set to MIDI WITH SONG POINTER, and the program receives a song pointer message, the cue sequence will be started at the location specified by the song pointer message, and recording will begin. If a second song pointer message is received, and no notes have been recorded, the program will start the record process again.

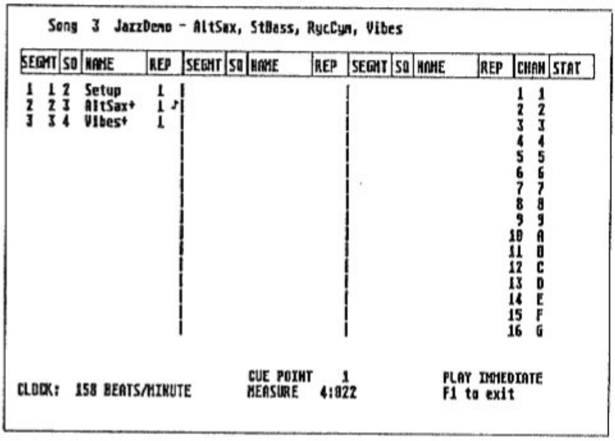
If a second song pointer message is received after some notes have been recorded, the program will end recording and play back both the cue sequence and the newly recorded sequence, starting at the song pointer location. You can still use CLR HOME to erase the new sequence and restart the recording process.

Chapter 8

Song Mode Play

The Song mode play screen allows you to play songs created on the Song mode edit screen described in Chapter 5. You cannot record while in Song mode. The Song mode play screen is reached from the Song mode edit screen by clicking on PLAY or pressing the right mouse button.

The following example shows the Song mode play screen as it might look before a song is started:



```
    Song  3  JazzDemo - AltSax, StBass, RycCym, Vibes

SEGMT|SQ|NAME      |REP |SEGMT|SQ|NAME      |REP |SEGMT|SQ|NAME      |REP |CHAN|STAT
 1  1 2  Setup      1  |                         |                         1   1
 2  2 3  AltSax+    1 ♪|                         |                         2   2
 3  3 4  Vibes+     1  |                         |                         3   3
                       |                         |                         4   4
                       |                         |                         5   5
                       |                         |                         6   6
                       |                         |                         7   7
                       |                         |                         8   8
                       |                         |                         9   9
                       |                         |                        10   A
                       |                         |                        11   B
                       |                         |                        12   C
                       |                         |                        13   D
                       |                         |                        14   E
                       |                         |                        15   F
                       |                         |                        16   G

                              CUE POINT    1              PLAY IMMEDIATE
CLOCK:  150 BEATS/MINUTE      MEASURE   4:022             F1 to exit
```

The Song mode play screen has several sections. The top line has the song number and title. The bottom of the screen is used for status lines, as in Open and Track modes. Most of the rest of the screen is used for a list of up to 48 song **segments**. A song can have up to 100 segments, but only the first 48 can be seen on the play screen. Each song segment shown has a number and a segment key. The segment keys are used to select segments, much like track keys can be used to select tracks in Track mode. Typewriter keys 1 - 9 are used for segments 1 - 9, keys A - Z for segments 10 - 35, and keys on the numeric keypad for segments 36 - 48. There is also a set of segment/channel options, selected with the function keys, which determine how the song is affected by selecting a segment.

Each segment plays a single Open mode sequence. The sequence key (for primary sequences) or a two digit sequence number (for secondary sequences) is shown in the SQ column. The sequence name is displayed in the NAME column, and the number of times the segment is to play is shown under REP. Other information will appear in the REP column as the song is played.

The right edge of the screen displays the status of the 16 MIDI channels. Each channel has a channel number and a corresponding key (1 - 9 and A - G). Channels can be soloed and muted, in the same way that tracks are in Track mode.

Playing the Song

Song play is started by pressing F10 or clicking the right mouse button. When play starts, the measure/step counter starts to count, and a red musical note will appear in the REP column for segment 1. This symbol indicates the segment currently playing. If the segment is programmed to play more than once, the number in the REP column will count down as it plays.

PAUSE and MIDI MERGE

The song can be paused at any point by pressing the ESC key; pressing ESC a second time lets the song continue. MIDI merging can be toggled using the SEMICOLON (;) key. PAUSE or MIDI MERGE will appear in red on the status line if either of these functions are active.

See the chapters on the Track and Open mode play screens for details on PAUSE and MIDI MERGE.

Cueing and Single Segment Looping

A song may also be started at an arbitrary cue point, just as in Track and Open modes. Pressing the TAB key starts the song at the current cue point. The cue point is moved forward or backward using the CURSOR UP and CURSOR DOWN keys, and the cue point move amount is toggled between one and eight measures with the INSERT key. See the chapters on the Track and Open mode play screens for more details on cueing.

The F2 key will cause the current segment to loop indefinitely. 99L appears under REP to show looping. Pressing F2 again will cause the segment to end after its current play.

Segment/ Channel Options

Song mode provides seven **segment/channel options** which allow you to alter the playback of a song, just as the track options discussed in Chapter 6 allow you to alter the playback of individual tracks. These options can assist you in composition by allowing you to hear sections of a piece in different contexts and instruments in different combinations. They can also be used to provide real time control in performance.

The current segment or channel option is selected with one of the function keys F3 - F9. Pressing a segment or channel key will cause the current option to be applied to the corresponding segment or channel. The segment/channel options are MUTE/UNMUTE, PLAY IMMEDIATE, PLAY AFTER CURRENT, SET LOOP START, SET LOOP END, SOLO, and SET SWITCH.

The MUTE/UNMUTE, SOLO, and SET SWITCH options are similar to the corresponding options in Track mode, but they apply to MIDI channels instead of tracks. The PLAY IMMEDIATE, PLAY AFTER CURRENT, SET LOOP START, AND SET LOOP END options are unique to Song mode and apply to segments.

The current segment/channel option is displayed on the right end of the top status line. The default is

PLAY IMMEDIATE, as shown in the screen example on the last page. Only one segment option or one channel option may be active at any time.

MUTE, SOLO and SET SWITCH

The MUTE, SOLO, and SET SWITCH options are very similar to the corresponding options in Track mode. MUTE is selected with the F3 key, SOLO with F8, and SET SWITCH with F9. When one of these options is active, keys 1 - 9 control channels 1 - 9, while keys A - G control channels 10 - 16.

When a channel is muted, MIDI data for that channel is not sent. When a channel is soloed, only data for that channel is sent. When a switch between two channels is set, the RETURN key alternately mutes one channel and unmutes the other. The words MUTE, SOLO, or SWIT will appear next to a channel which is currently muted or soloed, or for which a switch is in the process of being set.

See the chapter on the Track mode play screen for more details on muting, soloing, or switching.

PLAY IMMEDIATE and PLAY AFTER CURRENT

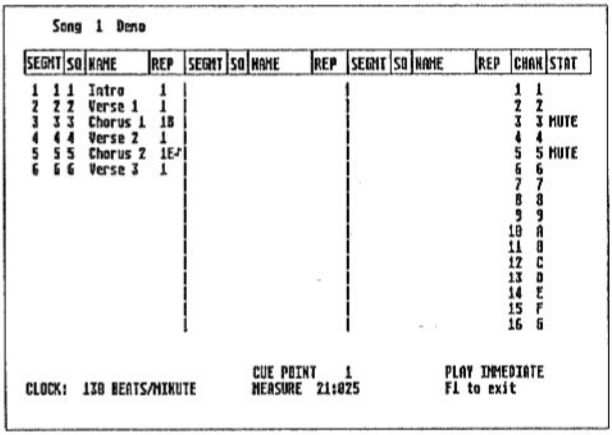
These features allow you to alter the order in which segments as a song is playing. When PLAY IMMEDIATE is active, pressing the segment key for any segment in the song will cause the program to immediately stop playing the current segment and start the new segment. The song will then continue normally from that segment.

PLAY AFTER CURRENT differs from PLAY IMMEDIATE in that the current segment is allowed to finish its current repetition before the new segment is started. This is especially useful when altering the structure of a song in real time with Song mode's interactive control features.

Song Mode Loops

Song mode allows you to set a starting and ending loop point, and to loop the song between these points. The loop points are defined in terms of segment numbers, not measures. The SET LOOP START and SET LOOP END segment options allow you to set the starting and ending segments for the loop. The letters B and E will appear in the REP column next to the beginning and end segments of the loop as they are set. Pressing the SLASH (/) key turns looping on and off. The word LOOP appears on the left end of the top status line when looping is active.

The following example shows the Song mode play screen after a song has been started, and loop points set:



```
   Song  1  Demo

|SEGMT|SQ|NAME     |REP |SEGMT|SQ|NAME     |REP |SEGMT|SQ|NAME     |REP |CHAN|STAT|
 1  1 1  Intro     1   |                         |                        1  1
 2  2 2  Verse 1   1   |                         |                        2  2
 3  3 3  Chorus 1  1B  |                         |                        3  3 MUTE
 4  4 4  Verse 2   1   |                         |                        4  4
 5  5 5  Chorus 2  1E♪ |                         |                        5  5 MUTE
 6  6 6  Verse 3   1   |                         |                        6  6
                       |                         |                        7  7
                       |                         |                        8  8
                       |                         |                        9  9
                       |                         |                       10  A
                       |                         |                       11  B
                       |                         |                       12  C
                       |                         |                       13  D
                       |                         |                       14  E
                       |                         |                       15  F
                       |                         |                       16  G

                                 CUE POINT    1            PLAY IMMEDIATE
CLOCK:  130 BEATS/MINUTE         MEASURE  21:025           F1 to exit
```

In this example, a loop has been set up between segments 3 and 5. Since looping is active, segments 3, 4, and 5 will play repeatedly until the loop is turned off with the / key. The red musical note indicates that segment 5 is currently playing.

Channels 3 and 5 have been muted. MIDI events on these channels other than program changes will be ignored. The segment/channel option is PLAY IMMEDIATE. Pressing any key in the range 1 - 6 will cause the program to immediately jump to the beginning of the corresponding segment.

Song Pointer in Song Mode	If the MIDI W SONG POINTER clock option has been selected on the SET OPTIONS screen, and a song pointer message is received, the program will start playing the current song from the point specified by the song pointer message.
Exit	Press F1 or the left mouse button to exit to the Song mode edit screen.

Chapter 9

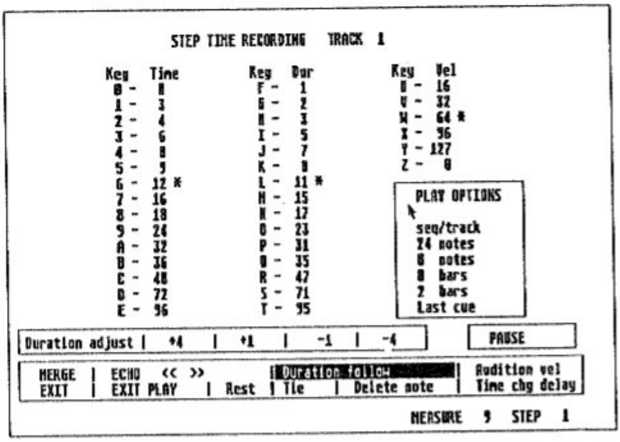
Step Time Recording

The step time recording features of the KCS allow you to record note information from your synthesizer keyboard, while using the computer keyboard or mouse to specify timing information. Note velocity can be specified from either keyboard. This can be a faster and more intuitive way of precisely entering rhythmically regular passages than the typing method described in Chapter 4. It is particularly convenient in Track mode, as the new passage can be played along with tracks that were previously recorded.

The step time recording screen contains fifteen choices for note times, fifteen choices for note durations, and six choices for note velocity. The current choices are indicated by a red asterisk. As you play notes on the synth keyboard they are recorded with the current time, duration, and velocity values. Each choice is assigned to one of the numeric or alphabetic keys shown to the left of the possible values. You can make a new choice for time, velocity, or duration by pressing the appropriate key on the computer keyboard, or by clicking the mouse on your choice. The red asterisk will move to display your choice. If you select a zero velocity, which is normally assigned to the Z key, the program will record the actual velocity with which each note is played on your synth.

A new Open mode sequence can be recorded in step time by selecting the STEP TIME option from the record dialog box. A new track can be recorded in step time by selecting the STEP TIME TRACK option. If you pick this option, the program will allow you to select the measure at which you will start recording. You can also extend an existing sequence or track using step time record by selecting the STEP TIME APPEND option. The step time recording procedure is the same in any case.

The step time record screen is shown below:



```
                 STEP TIME RECORDING   TRACK  1

        Key  Time         Key  Dur         Key  Vel
        0 -   0           F -   1          U -  16
        1 -   3           G -   2          V -  32
        2 -   4           H -   3          W -  64 *
        3 -   6           I -   5          X -  96
        4 -   8           J -   7          Y - 127
        5 -   9           K -   8          Z -   0
        6 -  12 *         L -  11 *       PLAY OPTIONS
        7 -  16           M -  15
        8 -  18           N -  17          seq/track
        9 -  24           O -  23          24 notes
        A -  32           P -  31          8  notes
        B -  36           Q -  35          8  bars
        C -  48           R -  47          2  bars
        D -  72           S -  71          Last cue
        E -  96           T -  95
Duration adjust |  +4  |  +1  |  -1  |  -4         PAUSE
 MERGE | ECHO  << >>          |Duration follow   | Audition vel
 EXIT  | EXIT PLAY   | Rest  | Tie  | Delete note | Time chg delay
                                           MEASURE  9  STEP  1
```

The choices for time, duration and velocity are listed in columns, along with the keys used to select the choices.

The bottom line shows the current measure and step, which will be the MSR-ST value for the next note entered. The box directly above this contains buttons for a number of step time recording options, as well as two exit buttons.

Recording in Step Time

Once the various record parameters are set up, recording in step time is simply a matter of entering the notes for each step from the synth's keyboard. Pressing and releasing a single key puts a single note at that step; pressing more than one key before any key is released puts a chord at that step. All notes played will be assigned the chosen duration and velocity values. The first note or chord will get a time of 0, while subsequent notes get the selected time value. The measure and step counters will be updated as each note is played.

While recording, you can select a new time, duration, or velocity value from any of the choices displayed by pressing the key shown next to the desired value, or by clicking on the new value with the mouse. The asterisk moves next to your choice, and subsequent notes will use the new choice.

If the DUR FOLLOW feature is active, selecting a new time will cause the program to select a new, proportional duration as well. This is convenient when entering data with a lot of different time values. The durations of the last note or chord entered will also be adjusted to the new value if DUR FOLLOW is on. This prevents the previous note from overlapping the new one if the time is reduced. DUR FOLLOW is on when the step time record screen is first entered, and can be turned on or off with the F4 key.

Changing the Time, Duration, and Velocity Values

You can easily enter time, duration, or velocity values other than the ones initially supplied by the program. While holding the SHIFT key, press the key for the time, duration, or velocity value you wish to alter; or place the mouse pointer on the value to be changed at click both mouse buttons together. A red ! will appear next to the selected value at the top of the screen and the message line will prompt you for a new **step time value**. You may enter up to a three digit number. If you enter a one or two digit number press RETURN. The new value will appear on the screen, and will be selected as the current value.

The fifteen time and duration values, as well as the five preset velocity levels, are stored along with other sequencer parameters in .ENV (environment) files, which are described in more detail in the next two chapters.

Time Chg Delay

Normally, selecting a new time value when entering a step time sequence or track causes the next note played to get the new time value. Enabling TIME CHG DELAY causes the new time value to be assigned to the next note entered, rather than the current note. This is more natural when entering a score from sheet music. TIME CHG DELAY can be activated with the mouse, or by pressing the SLASH (/) key. The default setting for this switch is off, but many users of the KCS find the on setting more intuitively obvious.

Rest, Tie, and Delete

Click on REST or press the F3 key to insert a rest in your recording. The measure and step counters will be increased, and the time value of the next note will be increased by the current time value. Click on TIE, or press RETURN to enter a tie. This will increase the time and also add the current time value to the duration of the most recently recorded note or chord. Clicking on DELETE or pressing UNDO will delete the last note or chord entered.

Play Options

The PLAY OPTIONS allow you to play back part or all of the sequence or track being entered. Each option can be selected by clicking on that option, or by pressing a key on the computer's keyboard.

SEQ/TRACK plays the current sequence or track from the beginning, and can also be selected by pressing F6. 24 NOTES and 8 NOTES cause the last 24 or eight notes entered to be played; the associated keys are F7 and F8, respectively. Play can be stopped with the F1 key or left mouse button, or restarted with F10 or the right mouse button.

8 BARS and 2 BARS, or the F9 and F10 keys, let you hear the last eight or two bars of your recording. In Open mode, you will hear the sequence in isolation; but in Track mode, all previously recorded and unmuted tracks will also be heard. The cue point will also be reset if you use these options in Track mode. In

Open mode, LAST CUE or the TAB key will play the current cue sequence from its cue point. If the current cue sequence is a control sequence that plays the sequence being recorded, this allows you to hear your recording in context. In Track mode, LAST CUE will play all tracks from the current cue point. You can interrupt or restart play as described earlier.

Audition Velocity

If you are not sure of the dynamics you wish to use for your recording, you can use the AUDITION VELOCITY feature to try different note velocities until you find the one that sounds best. Use the mouse, or press F5 to activate AUDITION VELOCITY. New notes will not be recorded; instead the current velocity selection will be changed to the velocity of each note as it is played. When you decide that you like the velocity of the last note played, press F5 again. Recording will resume using the new velocity value.

Note that if you're using a keyboard that sends release velocity, the current velocity selection will change when you release a key, as well as when a key is pressed. In this case, be sure to turn AUDITION VELOCITY off before releasing the key.

Duration Adjust

Clicking on one of the four DURATION ADJUST values, or pressing one of the four cursor control keys allows you to make small adjustments to the current duration selection, and to hear the result in the context of the current time value. Press the CURSOR RIGHT key to increase the duration by one, the CURSOR LEFT key to decrease by one, the CURSOR UP key to increase by four, or the CURSOR DOWN key to decrease by four. The most recently recorded note will be played eight times, with the new duration and the current time and velocity values. If no notes have been recorded yet, a middle C will be played.

Pause

If you want to play some notes without recording, press the ESC key. The word PAUSE will appear, and the program will stop recording. Press ESC again to resume recording.

ECHO and MIDI MERGE

If you are using a master keyboard and an external synth module, you will need to activate either ECHO or MIDI MERGE, just as you do on the other screens. These functions can be selected and the echo channel changed with the BACKSPACE, SEMICOLON (;), > (SHIFT-PERIOD), and < (SHIFT-COMMA) keys, as described in Chapters 6 and 7, or the mouse can be used.

If ECHO or MIDI MERGE is on while in step time record, the velocity of all notes received from MIDI will be reset to the currently selected velocity before the notes are transmitted to the MIDI out jack.

Exit from Step Time

Click on EXIT or press F1 to go to the edit screen, or use EXIT TO PLAY or F2 to go to the play screen.

Chapter 10

Load/Save

The Atari ST and Amiga versions of the KCS use six different types of disk files to store the data used by the program. Each file type has a unique extension. When you select LOAD/SAVE from one of the edit screens, a dialog box or edit window will ask whether you want to load or save a file, which disk drive to use, and what file type is to be accessed.

After selecting a drive (on the ST only) and file type, click on LOAD or SAVE. Another dialog box will display a directory of files with the selected extension on the current disk. In the Atari version, files are selected in this window using the GEM protocols that are discussed in the ST's documentation. In the Amiga version, a fairly self explanatory file select window will appear. After selecting a file name, click on CANCEL to exit or OK to load or save the file. You do not have to specify .ALL, .SEQ, .ENV, etc. as these extensions will be added by the program.

In the ST version of the program, clicking on FORMAT will format a blank disk for data storage. The file type selected is irrelevant when formatting a disk. Dialog boxes will confirm your choice, and ask for the disk type. (In the Amiga version of the program, you may format disks directly from the WorkBench.) Clicking on CANCEL exits the LOAD/SAVE screen.

File Types

.ALL files contain all songs, sequences, and tracks, plus the status of each individual track and the contents of the text area, in memory at the time the file was saved. .ALL files can only be loaded or saved from Track or Open modes. Loading a .ALL file will erase all data in the sequencer's memory.

.SEQ files hold a single track or sequence. These files can only be loaded or saved from Track or Open mode. The file saved will be the currently selected track or sequence; when loaded, the file will be put in the next available track or sequence, depending on the mode selected.

.TRK files hold all 48 tracks, plus their statuses. Saving all tracks can be done from any mode, but loading tracks can only be done from Track mode.

.SNG files hold a single song, as well as the sequences used in that song. When a .SNG file is loaded, each sequence is put in its original location, unless that slot is already occupied, in which case the sequence is moved to the first empty slot and the song is changed to reflect the new location. This allows merging multiple songs into a single .ALL file. Songs can only be loaded or saved from Song mode, and the song loaded or saved is the currently selected song or the next available song, respectively.

A set of Open mode sequences that are not otherwise used in a song can be saved and loaded as a group by creating a dummy song made up from a list of the desired sequences. In this case, though, PRIMARY and ST events contained in Open mode sequences will not be reassigned if that sequence is already in use, so you will need to be careful to avoid such conflicts if you use the dummy song method.

.ENV files are environment files, and contain most of the parameters displayed in the SET OPTIONS edit window, as well as the time, duration, and velocity values used in step time recording. If a file named DEFAULT.ENV is saved on the KCS program disk, this file will be loaded when the program boots.

.ENV files are also created automatically whenever you save a .ALL file. When a .ALL file is saved, the KCS automatically creates a .ENV file with the same name, and when a .ALL file is loaded, the program searches for a .ENV file with the same name and loads that file as well.

MIDI Files and File Formats

For Atari ST owners who would like to use KCS sequence files with other sequencers that support the MIDI sequence file format, we have written a utility program entitled CONVERT.PRG, which will convert KCS sequence files to MIDI standard files, and vice versa. (An Amiga version will be available shortly.) The MIDI sequence file format is an emerging standard, which has been unofficially adopted by many music software publishers, including Dr. T's, Opcode, Intelligent Music, Passport, and others. Instructions for the use of this program are contained in a README file, which is included with the program. CONVERT.PRG may be found on many MIDI related bulletin boards, or it may be obtained directly from Dr. T's for a nominal fee.

For advanced computer musicians who would like to write programs that can exchange files with the KCS, the file formats for the .ALL, .SEQ, .SNG, and .TRK file types are available for a nominal charge to cover printing and shipping. Contact us for more information.

Caveats

One point to be aware of when saving .ALL or other long files is that a computer with 1 Meg or more of memory can hold many more notes than can fit on a single disk. A double sided disk can hold about 120000 notes, and a single sided disk (on the ST only) only holds about half this number. If you somehow find yourself with more notes than will fit on a single disk, you will have to save some individual sequences or songs, then delete them and save the remaining data in a .ALL file.

CAUTION: With the exception of the DEFAULT.ENV file mentioned earlier, you should NEVER save your data files on the KCS program disk! This could cause conflicts with the program's copy protection, which will make it impossible to load the program. The write protect tab on the program diskette should be left open at all times, except when saving a DEFAULT.ENV file.

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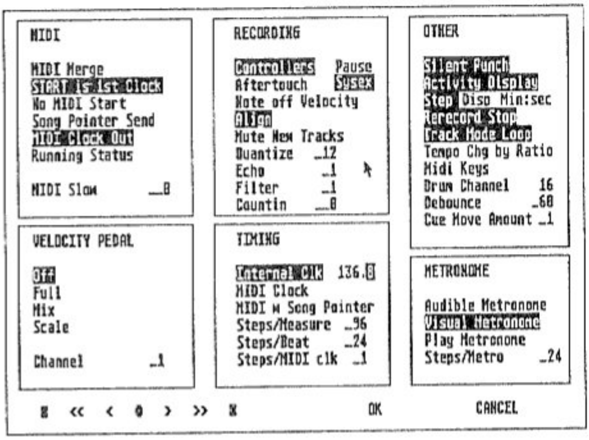
Chapter 11

Set Options

The SET OPTIONS edit window allows you to set a number of important parameters used by the program. The SET OPTIONS screen can be reached from any edit screen by clicking on SET OPTIONS, or from any play screen by pressing the 0 (ZERO) key.



MIDI

MIDI Merge
START is 1st Clock
No MIDI Start
Song Pointer Send
MIDI Clock Out
Running Status

MIDI Slow _8

RECORDING

Controllers Pause
Aftertouch Sysex
Note off Velocity
Align
Mute New Tracks
Quantize _12
Echo _1
Filter _1
Countin _8

OTHER

Silent Punch
Activity Display
Step Disp Min:sec
Rerecord Stop
Track Mode Loop
Tempo Chg by Ratio
Midi Keys
Drum Channel 16
Debounce _68
Cue Move Amount _1

VELOCITY PEDAL

Off
Full
Mix
Scale

Channel _1

TIMING

Internal Clk 136.8
MIDI Clock
MIDI w Song Pointer
Steps/Measure _96
Steps/Beat _24
Steps/MIDI clk _1

METRONOME

Audible Metronome
Visual Metronome
Play Metronome
Steps/Metro _24

The SET OPTIONS screen is divided into six areas, each of which contain buttons and numeric data fields for a group of related parameters. Settings for the different parameters are changed as described in the section on edit windows in Chapter 1. Most of the parameters on this screen can also be loaded from or saved to disk in a .ENV file, which is described later in this chapter.

MIDI

MIDI MERGE causes the program to transmit all data received at its MIDI in to the MIDI out jack. MIDI merge can be turned on and off from this screen, or with the SEMICOLON (;) key on any of the play screens. You will need MIDI merge if you are using a master keyboard and remote modules.

MIDI merge functions when the program is on one of the play/record screens, though not on the edit screens, and MIDI merging is overridden when ECHO is on. Also note that if a system exclusive message being received by the program is interrupted for some reason, the program will hang up until you press F1.

START IS 1ST CLOCK allows you to tell the program whether it should respond to a MIDI start or continue command as though it were the first MIDI clock, or simply as an instruction to start listening for MIDI clocks. If you are syncing to an external MIDI clock source, pick the setting which seems to sync better with your other equipment. In particular, if you are transferring sequences from another instrument using the techniques outlined in Chapter 13 and the time of the first event recorded is always off by one clock step, you should change this setting. This option has no effect if the internal clock is being used.

NO MIDI START lets the program respond to MIDI clock even if a MIDI start command is not received. This is sometimes needed for certain specialized applications involving recording from other sequencers, and has no effect when the internal clock is selected.

SONG POINTER SEND activates the transmission of MIDI song pointer messages by the KCS. When this option is turned on, the program will send an appropriate song pointer message whenever a song, sequence, or track is started from a cue point, or when a track loops to the beginning of a cue loop. The DLY button, to the left of SONG POINTER SEND, adds a one second delay between the MIDI Song Pointer and Continue messages after CUE is selected on any play screen. This allows the external instruments to catch up to the sequencer before it starts.

MIDI CLOCK OUT tells the program to enable or disable the sending of MIDI clock. If you are not syncing a drum machine to the KCS via MIDI clock, you may want to turn this off to reduce the amount of data sent via MIDI. For some specialized applications, you may want to send MIDI clock selectively from your sequences using * events, and not send it automatically with every clock step.

RUNNING STATUS reduces the amount of MIDI data transmitted by eliminating redundant status bytes, which can help reduce timing or other problems caused by MIDI data overload. Use with caution, especially if you are using a MIDI switch box.

MIDI SLOW adds a slight delay after each byte sent out over MIDI. Some MIDI instruments cannot respond to MIDI data when transmitted at the standard MIDI transmission rate (the baud rate to you techies). Yamaha instruments are the most notorious for this, but it is also a problem with some MIDIed Drumulators. If your instruments randomly miss or stick on some notes, try setting MIDI SLOW to a value in the 60's. Use the smallest value that you can for MIDI SLOW, as increasing it causes the program to spend time waiting around when it could be working.

MIDI instruments can also miss data because too much is being sent at one time. This sounds like the problem described above, but is actually quite different. The instruments get so much MIDI data that they have no place to put it while they are doing their other work, and some gets lost. MIDI SLOW will probably not help this problem. You will have to get some MIDI channel filters, so instruments only receive data intended for them, or you will have to record less data. Continuous controllers (mod wheels, pitch wheels, aftertouch, etc.) are a likely cause of this problem.

RECORDING

The options in this portion of the SET OPTIONS screen are used to set certain parameters which affect recording in Track and Open modes. With the exception of MUTE NEW TRACKS, all recording options affect both Track and Open mode recording. Many of these options can also be changed from the record screens as well, and further information can be found in those chapters.

CONTROLLERS, AFTERTOUCH, and NOTE OFF VELOCITY are used to enable or disable the recording of MIDI controllers (continuous controllers, pitch bend, and program changes), aftertouch, and note off, or release, velocity. The PAUSE switch, next to CONTROLLERS, allows recording controller settings when the sequencer is paused. When this switch is on, the *last value only* of any controller that is adjusted when the sequencer is paused will be recorded. This could be used, for example, to enter a single volume control message in a previously recorded part, by playing the sequence to the point of the insertion, pressing PAUSE, and then playing a few notes on the keyboard while adjusting the volume. Once you've found the proper setting, restart the sequencer by pressing PAUSE again, and the final volume setting will be recorded. (Of course, the RECORD switch must be turned on, as well, and the sequence or track containing the newly recorded data will need to be merged with the original track or sequence, as always.)

SYSEX enables the recording of system exclusive messages. When this switch is on, sysex messages of up to 5000 bytes can be recorded as single byte events. This is less memory efficient than storing sysex data in a librarian program, but it may be more convenient in some instances.

ALIGN is used to force tracks or sequences to "line up" with the start of each measure, when recording or playing. If ALIGN is on while you are playing sequences from the Open mode play screen, sequence playback will not start as soon as the sequence key is pressed, but at the beginning of the next measure. If ALIGN is on while recording in either Track or Open modes, recording will not stop immediately when the F10 key is pressed, but will continue until the start of the next measure.

MUTE NEW TRACKS causes tracks to be muted as soon as they are recorded. This is convenient, for instance, when recording multiple takes of a long solo over a track, since earlier takes of the solo will not be played back as the sequencer loops. It is also handy when looping over a short cue, to give you a chance to play a short riff many times while you work on getting it right.

QUANTIZE toggles real time auto-correction. When QUANTIZE is on, the time values and durations of all events recorded will be rounded to the nearest multiple of the number to the right of QUANTIZE. Unlike auto-correction from the edit screens, quantization cannot be undone. Another difference is that all event types, including controller events and program changes, will be rounded when QUANTIZE is on, whereas only note messages are affected by autocorrection.

ECHO is similar to MIDI merging, except that all data received is rechannelized before recording or transmission to the MIDI out jack. The number to the right of ECHO is the echo channel.

FILTER forces the sequencer to only receive data on a single MIDI channel, called the filter channel. Data on all other channels is filtered out. This is especially useful when recording data from another sequencer into the KCS, or when "expanding" a single channel's data from many sequences into a single sequence using the loopback recording technique described in Chapter 13. The number to the right of FILTER is the filter channel.

COUNTIN allows you to select the number of "free" steps that you get before recording starts in real time. The metronome will sound and MIDI clock will be sent during the countin, but the program's clock will be held at 0 until the count is over. Remember, this is set in steps, not metronome beats, so to get a one measure countin at 96 steps per measure, you must enter 96. The maximum value for COUNTIN is 255 steps.

OTHER

SILENT PUNCH only affects the operation of the sequencer in Track mode. When SILENT PUNCH is on, notes that are being punched out will be muted while punch points are being set. Once the punch points are set, the punched portion of the track will be muted regardless of the setting of this switch. SILENT PUNCH also affects notes that are deleted when LIVE EDIT is active - if SILENT PUNCH is off, notes that are being deleted will still sound when LIVE EDIT is on.

ACTIVITY DISPLAY enables the musical icons which appear next to active tracks in the track status display. You might want to turn the activity display off when recording or playing very dense musical passages, or when using high clock resolutions.

STEP DISPLAY enables the step portion of the measure/step counter. Turning the step display off reduces the computer's work load slightly, and allows the program to concentrate on more important tasks.

MIN:SEC DISPLAY enables the real time clock, which displays the amount of time elapsed since the sequencer was started. As with the STEP DISPLAY switch, turning this switch off may help in hypercritical timing applications. See Chapter 13 for details on the real time clock.

RE-RECORD STOP affects the operation of the UNDO key and RE-RECORD button in Track mode only. When this switch is highlighted, pressing UNDO will erase the current recording, stop the clock, and reset the measure/step counter. When RE-RECORD STOP is off, pressing UNDO will erase the current recording, but the sequencer will continue to play.

TRACK MODE LOOP, surprisingly enough, controls looping in Track mode. When this switch is off, all tracks will play through only once. It is also possible to play or record past the end of track 1 (which normally sets the loop point for Track mode) by turning TRACK MODE LOOP off. You should be careful about recording on tracks other than track 1 when TRACK MODE LOOP is turned off, since any data recorded past the end of track 1 will be lost when a DOUBLE, APPEND, or ALL TRACKS TO SEQ operation is performed, unless the length of track 1 is extended by changing the TIME value of track 1's final DE event.

TEMPO CHG BY RATIO changes the amount of tempo change which occurs when tempo is changed from the Track mode control panel, or from the computer keyboard. When this switch is off, the tempo will change by 1 BPM when any of the tempo controls is pressed; when this switch is on, the tempo will change by about 2.5% for each button press.

MIDI KEYS is a convenience feature for advanced KCS users, that allows controlling certain sequencer functions from an external MIDI footswitch controller. When this switch is on, MIDI controllers 64, 65, and 66 (the sustain, portamento, and sustenuto pedals, respectively) duplicate the functions of certain keys on the computer's keyboard on the program's Track mode, Open mode, and step time record screens. The sustain pedal duplicates the F10 key and right mouse button on all three screens, but is especially useful in Track mode, since this allows you to start recording and set the track loop point with no hands. In Track mode, the portamento pedal is equivalent to the RE-RECORD button, and the sustenuto pedal controls the STOP button. In Open mode, the portamento and sustenuto pedals are used to start real time recording, and duplicate the functions of the RETURN (record on next event) and ENTER (record immediate) keys, respectively. On the step time record screen, the portamento pedal inserts a rest, and the sustenuto pedal deletes the previous note. These controllers are recognized on all MIDI channels, and are not merged or recorded when MIDI KEYS is active.

DRUM CHANNEL selects one channel which will not be affected by any pitch transpositions, either as part of a song or control sequence, or when editing a sequence or track. This is intended for use with MIDI drum machines. Since drum machines assign each drum to a separate MIDI note, transposing a drum part will cause the wrong drums to be played by the sequencer; hence the need for a drum channel.

DEBOUNCE sets the amount of time a mouse button must be held down before it will repeat on the Open or Track mode play screens, in 5 millisecond increments. A value of 100 corresponds to 1/2 second. You may find that different values of debounce are needed for different applications.

CUE MOVE AMOUNT sets the amount that the cue point(s) will move when the cue move buttons are pressed. This will toggle between one and eight measures when the INSERT key is pressed on any play screen, but can be set to any value from 1 to 99 on the SET OPTIONS screen.

VELOCITY PEDAL

The switches in the VELOCITY PEDAL section are used to choose one of the three velocity pedal options, as well as the velocity pedal channel, which are used to affect note velocities during Open or Track mode recording, or when LIVE EDIT is active in Track mode. Velocity pedal in Open mode can only be selected from this screen. See the chapters on the Open and Track mode play/record screens for details on velocity pedal functions.

TIMING

The parameters in the TIMING section of the SET OPTIONS window are used to select the clock source and set the timing resolution of the sequencer. Chapter 13 has more information on timing resolution.

INTERNAL CLK selects the program's internal timer as the clock source. The number to the right of this switch is the tempo, in beats per minute. The tenths of BPM digit is treated as a separate field by the program, which means you will need to use the mouse to place the cursor on this digit. Remember that the internal clock is always used when playing a sequence or track from the edit screen, so the setting of the clock source selector switches will have no effect when working on the edit screen.

MIDI CLOCK selects an external MIDI clock as the clock source. The sequencer will wait for a MIDI start or continue message before starting any tracks or sequences, unless the NO MIDI START button is turned on.

MIDI W SONG POINTER selects the external MIDI clock source and enables the reception of MIDI song pointer messages. When a song pointer message is received, the sequencer will move to that point in the current song, cue sequence, or track, and play from that point.

STEPS/MEASURE sets the number of steps in a measure, which only affects the measure/step counter on the play and edit screens, and the event list on the edit screen. This value will change whenever an SM event is encountered in a sequence or track. The following table shows the correct STEPS/MEASURE setting for the most common time signatures and STEPS/BEAT values.

Time		**Steps/Beat**	
Signature	**24**	**48**	**96**
3/8	36	72	144
2/4	48	96	192
5/8	60	120	240
3/4	72	144	288
7/8	84	168	336
4/4	96	192	384
9/8	108	216	432
5/4	120	240	480
6/4	144	288	576
7/4	168	336	672

STEPS/BEAT sets the overall timing resolution of the sequencer. The standard value for STEPS/BEAT is 24. Higher values allow for more precise timing, but also make editing more difficult and put a greater strain on the computer, by giving it less time between steps in which to do its "housekeeping" chores.

If STEPS/BEAT is changed during a SET OPTIONS session, the program will ask if you want to "Adjust all event times?" when you leave the SET OPTIONS screen. Answering "y" to this question will compress or expand all event times and durations to match the new resolution. The program will also ask if you wish to adjust the related parameters. A "y" answer here will change the STEPS/MEASURE, STEPS/MIDI CLK, and STEPS/METRO settings proportionally, or "n" will leave the settings unchanged.

STEPS/MIDI CLK sets the number of sequencer steps between each MIDI clock. This should normally be set to 1 when STEPS/BEAT is 24, and adjusted proportionally when STEPS/BEAT is increased. The sequencer uses the current tempo setting to interpolate between MIDI clocks when an external MIDI clock is used and STEPS/BEAT is greater than 24, so there will be an improvement in resolution when STEPS/BEAT and STEPS/MIDI CLK are increased, even if an external clock is in use.

METRONOME

STEPS/METRO sets the interval between metronome ticks. The default is for the metronome to occur every 24 steps. If you want the metronome more or less often, or you change the STEPS/BEAT setting, you will want to change the number of steps per metronome.

AUDIBLE METRONOME enables or disables the metronome "click" that is produced by the monitor speaker.

VISIBLE METRONOME enables or disables the musical icon metronome that is shown on the Track mode and Open mode play/record screens.

PLAY METRONOME turns the metronome on when the sequencer is in play. If this switch is off, the metronome will only occur when the program is recording.

Environment Files

Most of the parameters shown on the SET OPTIONS screen can be saved in an environment file. This allows you to quickly and accurately change the recording and playback parameters when you move to a new recording situation. Environment files have a .ENV extension.

Environment files contain the values for time, duration, and velocity used on the Step time record screen, as well as the following SET OPTIONS parameters. All the parameters from the MIDI and METRONOME sections of the SET OPTIONS screen (except the DLY switch) are saved, and in the TIMING section, all parameters are saved. In the RECORDING section, the CONTROLLERS, AFTERTOUCH, and NOTE OFF VELOCITY record switches are saved, as well as the ECHO status and channel. In the OTHER section, all parameters except TRACK MODE LOOP, MIDI KEYS, and the CUE MOVE AMOUNT are saved, and in the VELOCITY PEDAL section, only the CHANNEL is saved. In the Amiga version of the program, the screen colors are also saved.

If a file named DEFAULT.ENV exists on the KCS program disk, it will be automatically loaded when the program boots up. .ENV files are also loaded and saved automatically with .ALL files, under the same file name.

If the STEPS/BEAT setting in the environment file is different than the current setting when you are loading a .ENV file, the program will ask if you want to adjust all event times. See the LOAD/SAVE chapter for more information on .ENV files.

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Chapter 12

MIDI

While it is possible to make good use of the Keyboard Controlled Sequencer without detailed knowledge of MIDI, you will undoubtedly find that as you start to realize some of the enormous potential inherent in most MIDI instruments, an understanding of the nuts and bolts of MIDI can be very helpful. This chapter contains information on a number of subjects pertinent to the KCS, but is by no means a complete guide to MIDI. Fortunately, a number of well written books on the subject have appeared on the market; we recommend tracking one down if you need more detailed information.

MIDI Connections

A MIDI cord consists of a twisted and shielded pair of wires, with the body of the plug isolated from the shield. At the MIDI out jack, the MIDI cable plugs directly into the synth or computer's circuitry; but at the MIDI in of the receiving instrument, the cable connects to an "opto isolator", which uses light, rather than electrons, to couple the signal into the instrument. This means that there is no electrical conductor between the MIDI in of one machine and the MIDI out of another, so you can't blow something by incorrect patching.

Although MIDI cables look the same as standard DIN or Roland sync cables, the grounding of the two cables is different. DIN cables can create "ground loops", which will cause hum and other nasty sounds to appear at the output of your synthesizer(s).

As mentioned in the first chapter of this manual, the Atari ST uses a nonstandard method for creating a MIDI thru connection with its MIDI out jack. This causes a conflict with some types of (nonstandard) MIDI cables which have the two normally unused pins (1 and 3) shorted to the pins which carry MIDI data (4 and 5). The best solution to this situation is to have the ST permanently modified to meet the MIDI spec; a less drastic solution is to check your cables with an ohm meter, preferably before leaving the store with them.

MIDI Modes

MIDI modes determine how an instrument will respond to incoming MIDI data. MIDI modes can be a source of confusion to beginners and pro's alike, primarily because one MIDI manufacturer misinterpreted the meaning of one of the modes when they introduced their first MIDI synthesizer. The three original modes were broken into four modes to allow for this. Since then, other manufacturers have created new modes to take advantage of various types of multi-timbral implementations. The original four MIDI modes can be selected on any synth that implements them through a control change (CC) event called a **mode message**; any other modes must be selected at the instrument or with a sysex message. The section below on USEFUL MIDI COMMANDS gives an example of how to select one of the four standard modes from the KCS.

The four standard modes are called Omni On/Poly, Omni On/Mono, Omni Off/Poly, and Omni Off/Mono; they are also known as modes 1 - 4, respectively. The two Omni On modes cause the synth to receive data on all 16 MIDI channels at once; this is good for keyboards that are connected together in a layering arrangement, but not so hot for sequencing applications. Many earlier synths and drum machines power up in mode 1 (Omni On/Poly), and must be changed to one of the other modes to be used in a multi instrument sequencing environment. Mode 2 (Omni On/Mono) is virtually useless in all situations, as it causes an instrument to play only one voice monophonically, from all MIDI channels. This is the extra mode that was accidentally created in the early days of MIDI.

The two Omni Off modes, modes 3 and 4, are more useful in a sequencing environment. Mode 3 (Omni Off/Poly) causes a synth to play all its voices polyphonically on one MIDI channel, while Mode 4 (Omni Off/Mono) puts each voice on a separate MIDI channel for monophonic operation. The CZ-101 and Sixtrak both use Mode 4 to implement their multi-timbral features, while more advanced synths like the Oberheim Xpander, Ensoniq ESQ1 and Yamaha FB01 use non-standard MIDI modes to allow assigning some voices to one channel, and some to others.

Other MIDI Messages

Some synthesizers can be placed in an operating condition called **Local Control Off.** In this mode, they will respond only to signals coming in via MIDI, while ignoring their keyboards. They will continue to send keyboard information via MIDI OUT. **Local Control On** will return the synth to normal operation. Local control messages are a subset of the continuous controllers, and are sent from the sequencer with CC events.

System real time messages are used to synchronize MIDI instruments in real time. The **timing clock** message will advance drum machines and sequencers to move in time with the sequencer. Other system real time messages include the **start**, **stop** and **continue** commands. Normally, these events are sent by the KCS at the appropriate times, but they can be sent as single byte messages for specialized applications. Other less useful real time messages include the **reset** and **active sense** messages.

System common messages are miscellaneous messages which can be sent to instruments, regardless of what channel they are on. These include the **song select** command, the **tune** command (which initiates oscillator tuning on analog synthesizers), and the much ballyhooed **song position pointer** message.

System exclusive (sysex) messages are used by individual manufacturers to do whatever they want to do with their instruments that is not covered in the normal MIDI spec. This includes, but is not limited to, functions such as patch dumps, remote button pushing, and even displaying messages on an instrument's display. You can use single byte events to send sysex information, but it is your responsibility to determine the response of your instruments to the information sent. The March 1987 issue of Electronic Musician has an article on using system exclusive data with the KCS.

Some Useful MIDI Commands

All of the message types described above can be sent from the KCS, either as CC events, or with single byte messages. While many earlier synthesizers, such as the Sixtrak, have their own controller assignments, the assignments of all MIDI controllers are now standardized by the MIDI Manufacturers Association, and are listed on the next page.

Many instruments also have assignable controls, which can be set to send or recognize any MIDI controller. This allows you to use any of the unassigned or less common controllers for whatever purpose you'd like. Examples of such instruments are the Oberheim Xpander, Matrix 12, and Xk keyboard the Yamaha KX76 and KX88 keyboard controllers, and the Kurzweil MIDIBoard.

Controller Name	Number	Range
Modulation Wheel	1	0 - 127
Breath Controller	2	0 - 127
Early DX7 Aftertouch	3	0 - 127
Foot Controller	4	0 - 127
Portamento Time	5	0 - 127
Data Slider	6	0 - 127
Main Volume	7	0 - 127
Balance	8	0 - 127
Pan	10	0 - 127
Expression	11	0 - 127
General Purpose #1	16	0 - 127
General Purpose #2	17	0 - 127
General Purpose #3	18	0 - 127
General Purpose #4	19	0 - 127
LSB's for #'s 0 - 31	32 - 63	0 - 127
Sustain Pedal	64	0 or 127
Portamento On/Off	65	0 or 127
Sustenuto Pedal	66	0 or 127
Soft Pedal	67	0 or 127
Hold 2	69	0 or 127
General Purpose #5	80	0 or 127
General Purpose #6	81	0 or 127
General Purpose #7	82	0 or 127
General Purpose #8	83	0 or 127
Tremolo Depth	92	0 - 127
Chorus Depth	93	0 - 127
Celeste Depth	94	0 - 127
Phase Depth	95	0 - 127
Data Increment	96	0 or 127
Data Decrement	97	0 or 127
Non Reg. Parameter MSB	98	0 - 127
Non Reg. Parameter LSB	99	0 - 127
Reg. Parameter MSB	100	0 - 127
Reg. Parameter LSB	101	0 - 127
Local Control On/Off	122	0 or 127
All Notes Off	123	0
Omni Off	124	0
Omni On	125	0
Mono On (0 = Omni Off)	126	0 - 16
Poly On	127	0

As an example of how these might be used, here is a sequence that sets a CZ-101 on Channel 5 to MIDI mode 4 (Omni Off/Mono), and then turns Local Control Off on channels 6 and 7:

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0	5	CC	126	0	
1-	1	2	0	6	CC	122	0	
1-	1	3	0	7	CC	122	0	

The other three modes require two mode change messages to select a particular mode, for instance, control changes on controllers 124 and 127 to select Omni Off/Poly On.

The numbers to be entered in single byte events for the other message types are given below:

Message Name	1st Byte	2nd Byte	3rd Byte
Sysex Start	240	ID #	
Song Pointer	242	LSB	MSB
Song Select	243	Song #	
Tune Request	246		
Sysex End	247		
Timing Clock	248		
Start	250		
Continue	251		
Stop	252		
Active Sense	254		
System Reset	255		

The values used for the second and third bytes in the first three messages must be in the range of 0 - 127. If you are using the song select message to select a song on an external drum machine or sequencer, you'll need to send a stop message just before the song select message, and a start message immediately thereafter. The form of system exclusive messages varies from one instrument to another; consult your manual for details.

Program Changes

The program numbers assigned to MIDI program change numbers can vary quite a bit from one manufacturer to the next. Generally speaking, sending a program change to a Sequential or Oberheim synthesizer will cause that patch number to be selected, while sending the same program change to a Yamaha or Ensoniq instrument will select that patch number minus one. Casio uses a strange overlapping system which is described in the APPLICATIONS chapter, while Korg, Roland, and others use a "bank system" in which programs are selected via a modified octal numbering system.

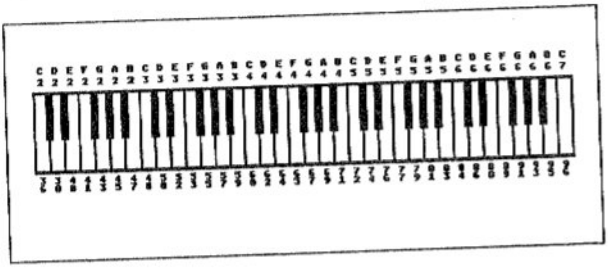
The following table shows which numbers to enter in a PG event to select a program on instruments that use the bank system. The Group A and Group B columns represent another level of program selection used on some Roland instruments. Use the values in the Group A column for synths without this feature.

Program	Group A	Group B
11 - 18	0 - 7	64 - 71
21 - 28	8 - 15	72 - 79
31 - 38	16 - 23	80 - 87
41 - 48	24 - 31	88 - 95
51 - 58	32 - 39	96 - 103
61 - 68	40 - 47	104 - 111
71 - 78	48 - 55	112 - 119
81 - 88	56 - 63	120 - 127

The MIDI implementation chart which comes with each instrument should describe the program numbering scheme for that machine: if not, REXMAN!

MIDI Note Numbers

MIDI note numbering is also handled differently by different manufacturers. The note numbering system used by Dr. T's is shown in the chart below, where the keyboard represents a five octave keyboard like those found on most instruments today. Note that the system we use does not coincide with that used by Yamaha. Yamaha designates the lowest key on the five octave keyboard C1, whereas we call that key C2.


C2 D2 E2 F2 G2 A2 B2 C3 D3 E3 F3 G3 A3 B3 C4 D4 E4 F4 G4 A4 B4 C5 D5 E5 F5 G5 A5 B5 C6 D6 E6 F6 G6 A6 B6 C7

MIDI Drums

When drum machines are played through MIDI, each drum is assigned to one or more notes on the MIDI keyboard. While newer machines allow you to assign each drum to a specific note (and possibly to a specific channel as well), there is sort of a quasi-standard in effect regarding drum machine note assignments. These assignments, which are also used in our Copyist transcription program, are listed below.

Drum	Note #'s	Notes
Bass	35, 36	B1, C2
Snare	38, 40	D2, E2
Rim	37	C#2
Claps	39	D#2
Floor Tom	41, 43	F2, G2
Low Tom	45, 47	A2, B2
Mid Tom	48, 50	C3, D3
Hi Tom	52, 53	E3, F3
Open Hi hat	46	A#2
Closed Hi hat	42, 44	F#2, G#2
Crash cymbal	49	C#3
Ride cymbal	51	D#3
Tamb/Crash 2	54	F#3
Cowbell	56	G#3
Shaker	58	A#3

Most drum machines only allow one note number to be assigned to a single drum. In this case, use the higher note for any drums which are listed with two numbers.

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Chapter 13

Tips For Advanced Users

In the four years since the release of Version 1.0 of the Commodore 64 KCS, the thousands of musicians who use the program have undoubtably come up with many thousands of useful techniques, tricks, and shortcuts. Much as we would like to, space does not permit us to present all of them here. This chapter discusses many fundamental KCS techniques which might not be obvious at first, and will hopefully serve as a catalyst for further experimentation.

Control Sequences in Open Mode

A sequence which consists of sequence control events (PRIMARY, ST, XX, XL, MS, US, PT, or VT) is called a **control sequence.** You may find it beneficial to record individual sequences or parts of songs and then use control sequences to start them up. This example will start three sequences together and end four measures later.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	0	0	1
1-	1	2	0		7	0	0	1
1-	1	3	0		2	-4	0	1
5-	1	4	384		DE			

When the control sequence which follows is started, sequences A and B immediately start and will play four times. One measure later, sequence 15 (which is a secondary sequence) starts playing for two repetitions. Two measures later, sequence B is forced to shut off, and another two measures later, the TM event will change the tempo to 100 beats/minute.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		B	0	0	4
1-	1	2	0		A	0	0	4
1-	1	3	96		ST	15	0	2
1-	1	4	192		XX	B		
1-	1	5	192		TM	100		

Creating Songs with Control Sequences

There are two techniques that we recommend for using control sequences to combine Open mode sequences into songs. The first technique involves creating a control sequence that starts other control sequences and waits for each sequence. This sequence controls the segueing of the sections of the piece. The sequences started by this sequence each start the sequences required by their section. In the following example, the song consists of sequence 1, followed by 2, 3 and then 1 again.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		1	0	0	1W
1-	1	2	0		2	0	0	1W
1-	1	3	0		3	0	0	1W
1-	1	4	0		1	0	0	1W

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	0	0	1
1-	1	2	0		B	0	0	2
1-	1	3	0		C	0	0	1W
1-	1	4	0		DE			

The second sequence above is sequence 1. Sequences A, B, and C are started together, and sequence 1 waits for sequence C to complete before ending. Sequence B is played twice. When using a structure such as this, you will probably want all parts to play for the same amount of time. In this case, sequence B would be half the length of sequences A and C. The W (Wait) for sequence C prevents the song from continuing to sequence 2 until sequence C has completed. The DE event may look superfluous, but it is necessary to keep sequence 1 from ending after sequence C is started, causing the main control sequence to continue. If you **always end a control sequence that will be started by another control sequence with a DE event**, you will prevent such problems without having to think about what goes on inside the program.

The other technique is to use a single control sequence without waits to "schedule" the starting of other sequences. This has the disadvantage of requiring you to compute and enter the times necessary to get all of the parts to start exactly when you want them to. It has the advantage of complete flexibility. Parts can be started while other parts are still playing, and XX or XL events can be used to stop looping parts without calculating their normal stop points.

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		A	0	0	1
1-	1	2	0		B	0	0	2
1-	1	3	0		C	0	0	1
9-	1	4	768		B	0	0	2
9-	1	5	0		D	0	0	99
9-	1	6	0		E	0	0	1
13-	1	7	384		F	0	0	1
13-	1	8	0		XX	D		

This example might be used to play a song with the same beginning as the one in the previous example. Eight bars into the piece, sequence B is started for two more plays. Sequence D, perhaps just a sixteenth note hi hat, is started indefinitely, and sequence E is started for a single play. Four bars after that, sequence D is stopped and sequence F is started. The second method is the one Dr. T usually prefers when he is composing music instead of writing software.

Control Sequences as Real Time Controllers

Many of the KCS's event types which modify the playback of other sequences can be used as real time controllers themselves, by creating control sequences which perform specific operations on other sequences. For example, suppose that you find that, when creating songs in Open mode, you often have a need to mute every part EXCEPT your drum sequences. Assuming that you use channel 16 for your drum parts, enter the following sequences in sequences 91 and 92:

MSR-	ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-	1	1	0		MS	*		
1-	1	2	0		US	*16		

MSR- ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 1	1	0		US	*		

Now typing 91 on the numeric keyboard will mute all active sequences, and immediately unmute all active sequences that start with an event on channel 16. This is effectively the same as muting all sequences but those on channel 16. Sequence 92 will return all sequences to their original, unmuted status.

Note that, as with all applications which involve starting Open mode sequences from the keyboard, the number of repeats programmed for each control sequence will have a profound effect on the operation of any real time control sequences. In the preceding example, if sequence 91 is set to loop indefinitely, then all subsequent sequences on that start with a channel other than 16 will be muted each time sequence 91 loops, and if sequence 91 is set to loop only once, then sequences that start after sequence 91 is played will not be muted. Generally speaking, real time control sequences should be set to repeat only once, if predictable effects are to be obtained.

Real time control sequences can perform more exciting functions than simply muting tracks, though. Suppose that, for some reason, you'd like to simulate the effect of playing a 33 RPM record at 45 RPM. In this case, you'd need to speed up the sequencer's tempo, while simultaneously transposing each part up by a corresponding amount. The following sequence does just that:

MSR- ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 1	1	0		AC	372		
1- 1	1	0		PT	*	5	

If you're picky about details, you could program a sequence in which the tempo and pitch transposition are gradually increased, to simulate the flywheel effect caused by the inertia of the turntable. Of course, you will probably want to create a corresponding sequence to return the speed to normal, unless you really enjoy listening to records at the wrong speed.

If you have created a series of real time control sequences that are useful in a number of applications, it may be convenient to save these sequences in a group, so they can be loaded for use with other sequences. This can be done by simply creating a song, in Song mode, which contains all of your real time control sequences. Such a song would never be played as other songs are, of course, but this technique allows these sequences to be saved and loaded as a group. See Chapter 10 for details.

Additional Control Sequence Techniques

You may wish to create a separate control sequence that contains all of the program changes needed for your song. You might want to put a few steps of rest in this sequence if using the first technique, or start this sequence slightly ahead of the others. The extra time gives the program changes a chance to "settle" before any notes are played.

You may wish to set up the basic structure of your song using either of the above techniques, and then use the RECORD WITH CUE feature to add additional parts which can start at any point in the sequence. You must then add a sequence start event (without a WAIT) for each new sequence at the beginning of the main control sequence. Dr. T frequently uses this technique to overdub continuous controller information after the basic piece is completed.

Suggestions on Timing Resolution

The Keyboard Controlled Sequencer defaults to a resolution of 24 steps/beat. This corresponds to clocks that are separated by about 20 milliseconds (ms) at a tempo of 120 beats/minute. The program allows you to increase the steps/beat value up to 384, but there are several reasons that we recommend a value no higher than 96.

Given that it takes 1 ms to send most MIDI messages, and that no instruments will respond instantly, setting the time between clock steps to 1 or 2 ms does not give you as much increased resolution as you might think. A higher resolution creates larger time and duration values which are more difficult to edit.

Other disadvantages stem from the design of the KCS. The program was designed to use the time between clock steps to do work to get ready for the next time step. If the time steps are too close together, the program will not always be able to do this work. The program was also designed to play the lower numbered tracks or sequences before the higher numbered. This order is preserved even when tracks are copied to a sequence. You can thus improve timing of critical parts by putting them on the lowest numbered tracks or sequences. If the time steps are so close together that the program has not finished with the previous time step before it is supposed to start the next, this advantage will be lost.

When in Track mode, timing accuracy may be affected slightly by mouse movement and placement. Generally speaking, if you have critical timing requirements, you should avoid moving the mouse while in Track mode, and, on the ST, keep the mouse away from any active display areas on the screen, such as the measure/step counter or the activity displays. We have never found a need to do this, but if you are a perfectionist and are working with a high resolution clock, these steps may be helpful.

The real time clock is derived from the same clock used to step through the sequencer. Thus, when an external clock is in use, the program has no direct knowledge of the tempo - so the calculations used to maintain the real time clock are based on the TM, AC, and DC events within a sequence. This might seem to be an inherently inaccurate method for calculating the time, but as long as the external clock source is a SMPTE or similar sync signal (such as that generated by our Model S synchronizer) *that was laid down using the same tempo changes*, the results are excellent. In our measurements, we have found the accuracy of this method to be around 1 second in 4 hours using the same computer as the clock source, though in real life the accuracy of the clock will be limited by the accuracy of the tape deck's motors. The tempo events in a piece are also used to calculate the real time clock value when chasing a cue point, either in response to a MIDI song pointer message or to selecting a "play from cue" operation, and to interpolate between MIDI clocks when synchronizing to an external 24 PPQN clock (for instance) while using a higher internal clock resolution. Since MIDI song pointer messages are quantized in units of six clock steps, the time and tempo calculation routines used for these purposes by the KCS expect to see TM, AC, and DC events auto-corrected to a six step grid. Otherwise, timing inaccuracies will result.

The longest single rest (DE event) that the program can record is 65535 steps, which corresponds to about 683 bars at 96 steps/measure. If you are recording a part that begins more than this number of steps into a track, the part will play 65536 steps earlier than you expect, and you will have to put extra rests in from the edit screen.

Syncing to Tape

If you are using a sync to tape box such as our Model S or the Roland SBX80, we suggest that you mute all tracks, sequences, or channels when you lay down the sync tone. The reason for this is that, when the sequencer is playing a full set of sequences, the MIDI data stream is pretty busy, and the timing of individual clock messages may be affected slightly. By muting all sequences, we allow the computer to function strictly as a very expensive but deadly accurate MIDI clock source, which is all that is needed when laying down a sync tone. However, be sure not to mute the conductor track in Track mode, or any Open mode sequences that contain TM, AC, or DC events, as this will eliminate all your tempo changes from the sync track!

The exact procedure for recording a sync tone will depend on your sync box, but the basic method is as follows. First, set up the sequencer as described above, then start the tape recorder. After it has run for a bit, start the sequencer. When the song has finished, stop the recorder and rewind the tape. (You might want to let the clock run on for a while after the song ends, in case you decide to lengthen the song later.) Now unmute all the previously muted tracks or sequences, set the sequencer's clock source to MIDI (or MIDI W SONG POINTER, if your sync box supports this feature) on the SET OPTIONS screen, and patch the MIDI clock output from the sync box into the computer's MIDI input. From here on, everything should function as described in your sync box manual.

Sending System Exclusive Messages

System exclusive messages, which most MIDI hardware manufacturers use to communicate patch data and other non-standard message types, can be sent from the KCS using single byte events.

For many shorter messages, the single byte events can be simply inserted in the sequence without any adjustments to the remainder of the sequence, but for longer messages such as data dumps, it may be necessary to add time to the sequence after the message, to allow the KCS to "settle". For example, it takes about 1 second to send a 3000 byte sysex message. This message should all be sent on one time step (that is, each event in the message should have a TIME value of zero) since the receiving instrument may react strangely if delays are inserted into the message. While the message is being sent, the sequencer is accumulating a "backlog" of other messages to be sent (MIDI clocks, note messages, etc.), which will all be sent immediately after the sysex message as the sequencer tries to catch up with itself. For this reason, it's a good idea to put a dead space, with no activity in either the sequence itself or any synchronized instruments, in the song immediately following any large sysex messages.

The KCS can directly record system exclusive messages of up to 5000 bytes if the SYSEX button on the SET OPTIONS page is active. Sometimes bulk dumps (which may be longer than this limit) may consist of a series of shorter sysex messages. These will be recorded properly if each individual message does not exceed this limit. For larger messages, the public domain program DRTSYSEX.PRG (ST only), which can be found on a number of MIDI related bulletin boards, can be used to convert sysex messages of up to 32K bytes into sequence files.

To record a sysex data dump from a MIDI instrument, turn on the SYSEX button on the SET OPTIONS screen, and select an Open mode sequence for recording. Following the instructions in your instrument's manual, initiate a data dump from the instrument's front panel. If everything is working properly, the sequencer will start to record immediately, and the word SYSEX will appear on the screen as the name for that sequence. The sequencer's clock may pause momentarily while long data dumps are being recorded.

If you have an instrument that does not allow sending sysex data dumps directly from its front panel, it may be possible to initiate a data dump by sending a "dump request" message to the instrument from the Open mode record screen, while recording the data dump in an Open mode sequence. Be sure that your dump request sequence is set to play only once; otherwise, strange behavior will certainly result. Synths which require handshaking during sysex dumps, such as Casio and some Roland instruments, will need to have delays inserted at certain points in the dump request. See your owner's manuals for details on dump requests, and please don't call us for help with specific instruments!

Transferring Sequences from Other Sequencers

If you are upgrading to the Keyboard Controlled Sequencer from a less powerful hardware or software sequencer, you might be wondering if you will have to redo all the work you've done on your old sequencer, to play the same music on the KCS. Fortunately, transferring sequences into the KCS from another instrument is quite simple. Essentially, we treat the older sequencer as a keyboard player with a built in MIDI clock, and let it play into the KCS while we record.

First, set the external sequencer to send MIDI clock, and disable looping, if possible. If you can't turn looping off on the external sequencer, make sure you have a blank sequence available in that machine. The tempo of the external sequencer can usually be set to its maximum value with no problems, which is handy if you have a lot of sequences to transfer; but be careful when transferring dense music, since minor timing discrepancies might occur due to MIDI data logjams.

On the KCS, set the clock source to MIDI, enable the recording of controllers and aftertouch, and turn MIDI MERGE on. ECHO should be off, and you will probably want to leave FILTER off as well, unless you want to record one channel at a time. QUANTIZE should be off, and ALIGN should be on.

Now go to the Track or Open mode record screen, as you prefer, and you are ready to record material from the original sequencer. If recording in Track mode, be sure not to set the length of all tracks. You can either record a single sequence, pattern, segment, whatever, from the external device, or an entire song. We usually prefer to record single sequences from the external device in Open mode, and then string them together using control sequences or Song mode. Once a sequence is recorded in Open mode, it is a simple matter to break it into individual channels by copying the sequence to Track mode.

When you enter the record screen, ensure that recording is enabled and press F10 or the SPACE bar to start recording. The KCS will wait for a start signal from the external sequencer. Start your song or sequence on the external sequencer, and data on all 16 MIDI channels will be recorded by the KCS. If looping is disabled on the older sequencer, then a stop signal will be sent at the end of the sequence and recording will cease. If looping is turned on, then select the blank sequence mentioned earlier after starting the external sequencer. On most machines, this will cause the blank sequence to start as soon as the first sequence is finished. Stop both sequencers after the blank sequence starts. In this case, you will undoubtedly need to remove some time from the end of the recorded sequence or track, to compensate for recording part of the blank sequence. In either case, you may also need to make slight adjustments to the timing of the first event of the track or sequence.

Since drum machines are nothing but stripped down sequencers with built in sounds, drum patterns can be transferred to the sequencer in the same way. This allows you to keep all of your drum parts on the same disk as the rest of a song.

For more information on transferring sequences between two instruments, see the December 1986 issue of Music Technology.

Loopback Recording

Loopback recording is an extension of the idea of transferring sequences from another sequencer; but in this case, the external device is replaced by a previously recorded track or sequence in the KCS itself. This might seem like a strange notion at first, but there are a number of applications for this technique. For example, loopback recording can be used to reduce a complex control sequence to a single sequence for use within a song, or for capturing a performance using the interactive play features of Track or Open modes.

To set up for loopback recording, connect the computer's MIDI in jack to its own MIDI out, either directly or through a merger. Set the clock source to INTERNAL CLK. ECHO and MIDI MERGE must very definitely be turned off, and MUTE NEW

TRACKS should be on if you're in Track mode. You will need to turn FILTER on if you want to record on only one channel while listening to all channels.

From here, the procedure is the same as recording from a keyboard, except that the KCS is providing the keyboard player. Simply turn RECORD on and start the sequencer. One way to use this technique would be to bounce portions of several tracks down to one track, while muting and unmuting the individual tracks as needed. The result would be a single track which contains only the portions of the other tracks that you want to keep. You could double portions of a track using loopback recording by muting the track in the appropriate places, and then merging the new track with the original. In Open mode, loopback recording can be used to reduce a song, which may have evolved from a few simple sequences to an ungainly collection of looped and unlooped control sequences interspersed with XX, XL, and other events, to a more manageable single sequence. If you prefer to create songs in real time by starting and stopping sequences from the keyboard, loopback recording can be used to capture such a performance.

The velocity pedal feature of Open and Track modes was designed specifically for use with this technique. As a sequence or track is played, it is re-recorded in another sequence or track with velocity values processed by the velocity pedal. When doing this, you will need to set the filter channel to the channel of the sequence or track that is being processed with the velocity pedal, so that only that channel is recorded.

Chapter 14

Troubleshooting

While MIDI is one of the most successful and consistent interfacing standards in the computer industry, it is still possible that certain types of equipment won't work well together. Many times, what might seem like a perfectly reasonable configuration won't give the expected results. This could be because you are trying to use a feature which is not implemented on a particular machine, or because you haven't initialized your synths correctly, or for many other reasons.

When you get into a situation like this, a MIDI data display program can be very helpful. You can then determine if a piece of equipment is doing what it is supposed to do, or if the problem lies elsewhere. A MIDI display program for the Commodore 64 was published in the September 1986 issue of Electronic Musician, and instructions for adapting this program to the ST appeared in the June 1987 issue. We're sorry, but Dr. T's can only answer directions directly regarding the operation of our software, and not questions regarding the idiosyncrasies of a particular piece of equipment. See Appendix 1 for further information on customer support.

There are two general approaches that are useful when troubleshooting a complex system. You can attempt to isolate the source of the trouble by changing one aspect of the system at a time, or you can simplify the system by using fewer pieces of equipment or program features. You should try both approaches when confronted with a problem in the use of the software. Don't forget the Doctor's prescription for dealing with MIDI technical problems, REXMAN (Relax, EXperiment, and read your owner's MANuals). The remainder of this chapter outlines solutions to various common problems.

Program Gives Errors on Loading

Does the computer load other programs? If so, you might have a bad disk. In this case, contact Dr. T's to arrange for a replacement disk. DO NOT send back your disk without contacting Dr. T's for a return authorization number. Returned products which do not display such a number on the outside of the package will be returned to the sender. And remember, NEVER save your data files on your KCS program disk!

Program Gives Errors While Running

If you booted your Atari ST from a system disk containing desk accessories, try re-booting from the KCS program disk.

If you are using an Amiga, it is possible that some other programs may cause problems when run concurrently with the KCS. Try eliminating all other programs from the Amiga's memory, or re-booting from the KCS program disk. We are interested in hearing about any problems you may have when multitasking the KCS with another company's product, but we cannot guarantee that we will be able to solve the problem.

Computer Appears to be Dead

Adjust your monitor settings, and check for a loose monitor cable. Is the disk drive on and is the drive cable OK? Is the mouse properly inserted in the correct jack? Try turning the computer's power off for at least 15 seconds, then re-boot. This forces the computer to completely clear it's memory.

Instruments Do Not Respond

First check to see that all your MIDI cables are connected properly, that data reception is enabled on each instrument, and that the correct channel assignments are being used.

If nothing plays at all, the program might be set to sync to a nonexistent external clock. Check the clock source on the SET OPTIONS page.

The program may have crashed. Save your files (if possible), remove the disk, power down or reset the computer, and then run the program again.

If a sequence or track that you've just finished recording won't play back, use the edit screen to confirm that you have actually recorded data, and that it's on the right channel. Check your master synth, as well as the ECHO and FILTER settings on the SET OPTIONS screen if not.

Continuous Controllers are Recorded Incorrectly

Occasionally, a long string of continuous controller messages, such as pitch bend or the modulation wheel, may be recorded as a string of program changes or other incorrect message types. This happens if the instrument used for recording employs running status, and recording is turned on after the start of the controller motion. When running status is used, a MIDI status byte is sent only at the start of the controller motion, rather than with each individual message, and if recording is enabled after this single status byte is sent, the KCS (or any MIDI device, for that matter) will not interpret the subsequent data correctly. If this happens, simply re-record the controller data, but play a single note before moving the controller. This ensures that a status byte will be sent at the beginning of the controller motion, and the note can be easily removed on the edit screen. Note that changing the RUNNING STATUS switch on the SET OPTIONS screen of the KCS will not help with this problem.

Some Instruments Don't Respond Correctly All the Time

Some instruments can't respond to MIDI information at the full specified MIDI rate. This is especially true for some DX7s. The symptom is that the instrument appears to be missing notes. Sometimes changing programs will fix the problem; a more drastic action is to re-power the instrument. Use the MIDI SLOW function in the SET OPTIONS section of the program to slow down the MIDI transmission rate. Use the lowest value which provides acceptable results. MIDIed Drumulators are also susceptible to this problem.

Sequencer Plays Back, but Notes are Garbled

Using nonstandard MIDI cables on the Atari ST's MIDI output can cause this problem, especially if you're playing an instrument that's connected to the computer's MIDI in at the same time. Check your cables to make sure that pins 1 and 3 are not shorted to pins 4 and 5. Some synthesizers also have these pins shorted together at their MIDI inputs, which will cause problems if you are using a 5 conductor MIDI cable, though three conductor cables do not exhibit this problem.

Are notes overlapping improperly? If an instrument is in mono mode and notes overlap, the instrument may not retrigger its envelopes. If an instrument is in poly mode and notes of the same pitch overlap, undesirable results might occur. If a note ends and a new note begins in the same time step, the new note will start before the old one ends, causing an overlap.

Sending program changes too close to a note on or off message can cause missing or stuck notes on some synths. Try moving any program changes in the area of the affected notes.

Synthesizers Spit Out Notes at High Speed

If you loop an Open mode sequence that contains one or more MIDI events, all with times of zero, the program will send these MIDI events as fast as it can, causing your synthesizer to sound as if it's going haywire. If you loop a control sequence of length zero, and the control sequence does not have a WAIT programmed, that sequence will keep restarting all of the sequences it is controlling, and they will keep replaying their first notes. Don't loop any sequence whose times are all zero, unless it has a WAIT programmed and a DE event at the end. A MIDI loop condition, where the computer's MIDI out is fed back to its own MIDI in through a merger, can also cause this to occur.

Instrument Sends Data, but Doesn't Receive

The instrument may not be set to receive on the MIDI channel that it is sending on. Are your MIDI cables good? Some sync cables look like MIDI cables, but won't work properly for MIDI. Check that the synth's MIDI receive channel is the same as its send channel, and that ECHO and FILTER are set properly.

MIDI Controllers Are Not Recorded

Have you set the KCS to record controllers? Does this instrument send and receive the controllers you're using? Some early MIDI synths, such as the Roland Jupiter 6, won't send control changes over MIDI. Others, like the Prophet 600, must have controllers enabled from the front panel each time the synth is turned on. Early DX7s sent aftertouch as controller 3.

Sequencer and Drum Machine Go Out Of Sync When Looping

This can occur if the length of the sequence in Open mode or of track 1 in Track mode is not a multiple of the length of the drum box pattern. Check to make sure that the sequence ends on the first step of a measure, rather than step 96 or some other nearby value.

If you do not use the ALIGN feature while recording, you will almost always end the recording process a little before or after the end of a measure. On playback each loop will put the sequence further out of sync. When using ALIGN, you must press the F10 key during the last measure that you wish to record. Pressing F10 a fraction of a beat into the next measure will force the program to continue recording for another entire measure, even if you do not play any notes. Clicking on STOP or pressing F1 immediately stops recording and defeats the ALIGN feature.

If a drum box is synced to the program via MIDI, it may lose timing clock information if too much MIDI information is being sent. As the piece progresses the drum machine will go further out of sync. Does the drum keep sync when only playing a few sequences? Does it play better if no sequences with PB, AT or CC events are running? Selecting RUNNING STATUS on the SET OPTIONS screen may help. Other ways around this are to use the drum machine as the master, or to have the KCS play the drums instead of sending time to the drum machine to play its own patterns.

Synths Not Accepting Program Changes

Some synthesizers, for example Sequential's instruments, power up in a mode in which they do not accept program changes via MIDI. Your synthesizer manual should contain instructions on how to make them accept program changes. Many instruments only accept a limited range of program numbers, and reject all others.

A Programmed Wait Does Not Occur

Sequences which call other sequences and use the WAIT feature should have a DE event with a time of zero for the last event. If you do not do this, you will encounter problems when you try to chain this sequence into a higher level control sequence.

Noticeable Time Delays Occur When Sequences Start or Loop

The computer is a powerful, but finite tool. If you attempt to play several sequences simultaneously, which in turn each play a lot of notes simultaneously, the computer may lag. If this occurs, rearrange your sequence structure to reduce the amount of work the computer has to do in one time step. Edit the timing so that not as many sequence start events occur at the same time.

Most instruments will react strangely if you try to send a patch change and play a note in the same time step. See the note on program changes under Sequencer Plays Back, But Notes Are Garbled.

Synthesizer Not Functioning in Multi-Timbral Mode

Some multi-timbral synthesizers (the Sixtrak and the CZ-101, for example) power up in poly mode. To use the multi-timbral feature, you must set them to mono mode, either through MIDI (see the MIDI chapter) or by following the instructions in your owner's manual. The Sixtrak will always transmit on its basic channel, so you may need to use Local Control Off and ECHO to record in real time. You will have to use the edit screen to insert program changes for each channel recorded, as selecting a program on the Sixtrak affects all six voices.

If a synth appears to be responding sluggishly in multi-timbral mode (short staccato notes are lost or one note may have a rough attack), try using the MIDI SLOW option on the SET OPTIONS screen.

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Chapter 15

Application Notes

This chapter contains tips for making better use of certain instruments with the Keyboard Controlled Sequencer. Since new equipment continues to be released at an increasing rate, it is not possible to make a complete listing of products that will work with the program. Many instruments share design features, so the following information may be useful even if you do not own the instruments discussed.

Casio CZ Series

The Casio CZ-101 is a programmable eight voice polyphonic digital instrument. It can hold 32 programs (16 of these are presets and may not be changed) or 48 programs if you buy the optional RAM cartridge. Dr. T's also has available a patch librarian/editor for the CZ, and RAM cartridges pre-loaded with 64 of our favorite sounds.

The CZ-101 is very useful with the KCS because it can also function as four mono synths. It may be programmed to work on any four adjacent MIDI channels, with each channel playing a different sound. One drawback is that there is only one output jack for the four different sounds. You will have to change DCA envelope levels to balance the relative volumes.

There is no MIDI thru on the CZ synthesizers, so you'll need a MIDI junction box or else patch the CZ at the end of the MIDI chain. The CZs are not sensitive to velocity but respond well to variations in duration because of their three 8 stage envelope generators. You can put the CZ-101 in mono multi-timbral mode by pressing the SOLO button. You can then use the MIDI, cursor right, and up arrow buttons to select programs, or you can select programs from the sequencer. Note in the multi-timbral mode the CZ may not always react predictably. Notes may get chopped or missed. If doing serious recording, you may wish to use a syncing device and record each Casio part in normal rather than in mono mode. This will also depend on what patches you are using and the value of the notes it is receiving. Casio has an "overlap" in its program calling. A program on the Casio can be specified with either of two numbers when selected from the sequencer.

KCS PG Value	CZ Program
0 - 15	Presets 1 - 16
16 - 31	Presets 1 - 16
32 - 47	Internal 1 - 16
48 - 63	Internal 1 - 16
64 - 79	Cartridge 1 - 16
80 - 95	Cartridge 1 - 16

The CZs have one MIDI controller conflict with other instruments. MIDI controller 6, which is assigned to the data slider on most instruments, is used for a tune control on the CZs, which can cause problems if data slider information is accidentally sent to a CZ. Another quirk of the CZs is that in Mono mode, pitch bend is only received on one channel - and not the basic channel, as you'd expect, but the most recently selected voice channel, which is shown beside the letters VO in the Casio's MIDI display.

Korg EX-800, Poly-800 and DW-6000

The Poly-800 and EX-800 are similar, with the newer EX-800 being a keyboardless version of the Poly-800 with a few more features. Both machines send on channel 1 and may be set to receive on any channel and both may select an external MIDI clock to drive their own sequencer along with the KCS. The Poly 800 sends its sequence data on channel 2.

The DW-6000 is a 6 voice synth with 64 programmable memories. It features a digital waveform generator system. The DW-6000 will send and receive note data, program change, pitch bend, OSC mod, VCF mod, damper pedal, portamento switch and system exclusive messages.

Korg instruments use a modified octal numbering system to arrange patches into "banks", as described in the MIDI chapter.

These Korg instruments neither send or receive velocity, but they do respond to MIDI volume information. Standard MIDI controller assignments are used, except for mod wheel and breath control (controllers 1 and 2), which are used for joystick up and joystick down on the Korgs.

MIDI Clock and Merge Boxes

The MIDI interfaces used by the Amiga and ST do not provide any inputs other than MIDI in. If you want to sync to tape or to an external drum machine, you need a device that provides MIDI clock to the computer. If you want be able to use the real time record features of the KCS while syncing to tape, you need a device that can combine the MIDI clock signal from you drum machine or sync box with the MIDI output of your keyboards. The Yamaha KX76 and KX88 keyboards do this automatically, and some others may as well. Harmony Systems, JL Cooper and others make MIDI merge boxes, which merge two MIDI inputs into a single MIDI output. Yamaha makes a device which does MIDI merge and also provides several additional continuous controllers. Any of these will allow you to merge MIDI clock with MIDI keyboard data, and newer models will simultaneously generate a MIDI clock and merge it with data from one or more MIDI instruments.

MIDI Junction or Thru Boxes and MIDI Switcher Boxes

Many companies manufacture MIDI thru boxes. They consist of one MIDI input and several MIDI outputs, and are useful if you have several instruments with no MIDI thru's. Kamlet, 360 Systems, JL Cooper, and others make MIDI switcher boxes. These are more elaborate boxes that allow you to choose among several MIDI inputs for each of 8 or 10 MIDI devices. We find these invaluable in our setups.

Ensoniq Mirage

The Mirage sampler responds to velocity changes particularly well with velocity controlled ADSR's, velocity sensitive oscillator mix, and keyboard scaled decay. You may have several samples spread across the keyboard, giving the impression that it are several instruments (although there is only one audio output). You can balance the volume between the two keyboard sides. The instrument powers up in omni mode.

The Mirage Operating System Version 3 update adds a lot more MIDI control to the instrument which the KCS can address using CC events or single byte messages. Among the performance enhancements are aftertouch, breath controller, and Local Control Off. The Mirage can also be made to initiate a disk load by sending it an appropriate program change command; see your Mirage manual for details.

Ensoniq ESQ1

The ESQ1 is a very powerful eight voice multi-timbral synthesizer, which can receive on up to nine channels simultaneously when the instrument is in multi mode. Channel assignments are controlled by the ESQ1's internal sequencer. Since each sequence on the ESQ1 can be selected from MIDI by sending an appropriate song select command, it is possible to re-assign the channels that the ESQ receives on from one instant to the next.

Since voices are assigned to channels on an "as needed" basis, it is possible to play up to eight voices on any of the nine channels at one time, without worrying about which channel has how many voices assigned to it. The keyboard sends release velocity through MIDI, though the ESQ won't recognize this information. It is also possible to push any button on the ESQ's front panel via system exclusive messages; see the version 2.0 update documentation for details.

Oberheim Xpander

The Oberheim Xpander is a six voice multi-timbral MIDI expander, with one of the most comprehensive MIDI implementations of any instrument. Any voice can be assigned to any channel in Mono mode by selecting that channel as the input on the Xpander's ZONE/CV pages, or a voice can be placed in Omni On/Poly or Omni Off/Poly by selecting a zone as an input.

When the Xpander is in Multi Patch mode, it will only receive patch changes on the basic MIDI channel, even if voices within the multi patches use other channels. Of the five assignable controllers, Lever 2 and Pedal 2 are always received only on the basic channel, and are applied to all voices in a multi patch; while Lever 1, Pedal 1, and Pressure are received separately for each channel.

The Xpander also has an extensive system exclusive implementation. Individual pages can be selected, buttons pressed, and knobs turned through sysex messages; it is even possible to send messages to the Xpander's fluorescent display from MIDI! Contact Oberheim for the Xpander/Matrix 12 MIDI Guide for more details.

360 Systems MIDIBass

The MIDIBass can respond to program changes and velocity. Since the MIDIBass can only play one note at a time, make sure your note durations don't overlap into the next note. Sometimes this effect is useful, because it does sound somewhat like a bass player "tripping over a note". Different sound chips available for the MIDIBass do not all cover the same note range.

Yamaha DX7 and TX7

The DX7 makes an excellent recording keyboard for the Keyboard Controlled Sequencer because it has good dynamics and sends and receives most MIDI control parameters. Since it has 16 voices, the sequencer can echo back to the DX7, without much risk of running out of voices.

A few subtle changes have been made to the DX7's ROMS since their initial release. DX7's can only send on MIDI channel 1, but may receive on any channel. Early DX7s use controller 3 for aftertouch, and will not respond to AT type events. When recording, you may find you want to turn on the KCS's aftertouch filter because aftertouch uses up memory very quickly. The addition of the E! modification from Grey Matter Response greatly enhances the DX7, giving it Local Control Off, ability to send on any channel, a lot more programs in memory, and other neat features too plentiful to list here.

To specify a program change for the DX7, use a program number that is one less than the program you want on the DX7. The DX7, like all Yamaha synthesizers, numbers its programs beginning with 1 while most other instruments start counting at 0. For example, a PG 22 event sent from the sequencer would call up program 23 on the DX7.

A keyboardless version of the DX7, the TX7, can respond to more controllers than the DX7, and has function memories for each program so that modulation depths will differ from patch to patch. The TX7 can only hold 32 programs in memory.

Yamaha FB01

The FB01 is a very popular and inexpensive multi-timbral synthesizer expander, which can receive on up to eight channels simultaneously. This synth has a number of hidden features which aren't specifically mentioned in the owner's manual, but are invaluable to anyone controlling it from a sequencer. Using system exclusive messages, it is possible to select any of the twenty configurations from the sequencer, to change the overall volume of the synth, to select any of the 384 patches on any channel within the currently selected configuration, and to perform a number of other useful functions. The information on how to do this is buried quite effectively inside the MIDI implementation section at the back of the manual, though it is well worth digging out.

Yamaha KX76 and KX88 Master Keyboards

CAUTION: KX76s and KX88s can have problems when using the MIDI merge feature of the KCS. If you patch a KX76 or 88 to receive data from the KCS, and then send it on to the receiving synths, and the KX76 or 88 (or at least ours) receives too much MIDI data at one time, it will erase its internal memory and go back to the state it was in when it was shipped from the factory. Beware of MIDI loops and length 0 sequences when using a KX76 or KX88 in this manner.

Yamaha RX11 and RX15 Drum Machines

The RX11 features several variations of the most essential drums. There are 8 snares, 3 kicks, 3 closed hats, 2 open hats, 2 cowbells, 2 claps, and 2 rimshots. It is possible to set the instrument select, note number, volume, pan, and MIDI channel assignment for each drum from the KCS using system exclusive messages; the codes for doing this are contained in the RX11 service manual.

One problem with the RX11 is that it can not record when synced to an external device, either through MIDI or the tape sync input; nor will it send a MIDI clock or tape sync pulse while recording. It also "hangs up" and refuses to accept MIDI information for about two seconds after receiving a MIDI start command, if it is set to an empty pattern or song. For these reasons, it is best to ignore the RX11's pattern recording features and use it strictly as a drum synthesizer, with the KCS controlling the drums via MIDI note commands. In this case, set the RX11's clock source to EXTERNAL.

The RX15 is similar to the RX11, but has fewer features. There are not as many drums, fewer patterns and only two audio outputs. Nor does it receive the system exclusive messages that the RX11 recognizes. One problem the RX15 has when syncing to MIDI clock is that occasionally, if it receives too much data (such as note information intended for another instrument) it will start to miss MIDI clocks. This causes the drum machine to lose sync, and the musician to pull his hair out. Try activating RUNNING STATUS on the SET OPTIONS screen.

Otherwise, you will have to get a MIDI channel filter box to use with the RX15, use the RX15 as the master clock source, or use it only as a drum synthesizer, as we do.

SCI Drumtraks

The Drumtraks, now discontinued, was the first MIDI drum machine on the market, and thanks to software updates and the low price of used instruments, is still a good choice for a basic drum unit. The Drumtraks recognizes MIDI notes as drum triggers, and responds to velocity as well. When first powered up, the drum machine is in Omni Mode On/Poly, and a mode change message must be sent to turn Omni mode off.

The version 0.5 Drumtraks software greatly enhances this machine's usefulness as a MIDI drum expander, as it adds the ability to tune the drums in real time from a keyboard or pitch wheel. Unfortunately, this is implemented in a manner that makes it cumbersome to tune the drums from within a sequence. Recording the drum parts in the Drumtraks and then transferring them to the KCS is the easiest way to create tuned drum parts. When doing this, the KCS must be set to record note off velocities from the SET OPTIONS screen, since the Drumtraks sends overlapping note on messages to control the drums' tuning.

Appendix 1

Service and Support

This program and the associated documentation are copyright (C) 1986, 1987, and 1988 by Emile Tobenfeld. This program is licensed to be used on a single machine, by the original purchaser only. It may not be copied without explicit written permission.

The diskette on which the program is furnished is warranted for ninety (90) days from the date of delivery. The program is not guaranteed to meet your requirements, and operation of the program is not guaranteed to be uninterrupted or error free. **In no event will Emile Tobenfeld or Dr. T's Music Software be liable for any damages, including any lost savings, lost profits, or other incidental or consequential damages arising out of the use or inability to use this program, even if we have been advised of the possibility of damages. Dr. T's Music Software and Emile Tobenfeld shall not be responsible for any damages claimed by any other party, resulting from the use or attempted use of this program.** All warranties implied are with Dr. T's, not your local dealer. If problems arise, call Dr. T's directly.

Copy Protection and Backups

The disk containing the KCS is copy protected, and must be inserted in drive A: on the Atari ST, or any disk drive on the Amiga, when running the program from either the hard or floppy disk. We regret the necessity for copy protection, but experience has shown this to be the only way to deal with unauthorized distribution of our programs. **Software piracy is a crime and deprives your fellow artists of their rightful income.** Because of this problem, we are much more fun to deal with if we have your completed warranty card in our hands when you call for technical support.

Backup disks may be obtained from Dr. T's for $15, when you send in your warranty registration card. You must include either your completed warranty card or your diskette serial number and a copy of the sales receipt with your request for a backup. There is a $15 charge for the replacement of program disks that become defective more than 90 days after the date of purchase. We will only sell one backup disk to each customer, and you will be required to return either your backup or original disk when ordering updates or replacement disks.

When returning disks for replacement or updates, **please send the disk by UPS, Federal Express, Express Mail, or some other service that will allow you to trace the shipment.** We're sorry, but we cannot be held responsible for packages sent via regular US mail.

Dr. T's reserves the right to make improvements to the program without notice, and to make what we consider to be reasonable charges for updates.

What To Do If Problems Arise

If you have problems with the KCS that you are unable to solve with the help of the manual, Dr. T's maintains a customer service line staffed by experienced MIDI musicians. We are happy to help you with questions regarding the KCS and any of our other programs, but due to the incredible variety of MIDI products available today, **we cannot answer questions regarding other manufacturer's hardware or software, including questions on the basic operation of GEM, Intuition, the Atari ST, the Commodore Amiga, or any other computers.**

When calling Dr. T's for customer service, there are a number of things that you can do to help us help you, which can also save you money on your long distance bill. Here is a check list of things to have ready when calling Dr. T's:

1 - Your diskette registration number
2 - Your manual
3 - Computer turned on and KCS booted
4 - Any data related to the problem
5 - Information on your computer's disk configuration, monitor type, printer type, etc.
6 - Paper and pencil

When you call us, we will walk you through the program and ask you questions about what happens, so it is very important that you have this material at hand when calling. If you don't have this ready, we will ask you to call back later with the required information. After you've completed the checklist, call us at **(617) 244-1542** between 10 AM and 4 PM Eastern Standard Time, Monday through Friday.

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Appendix 2

Command Key Reference Lists

The next few pages contain reference lists of the keyboard functions on the Track, Open, and Song mode play and record screens, and the step time record screen. You may make copies of these pages and keep the copies close at hand when using the KCS, if you like.

TRACK MODE PLAY/RECORD SCREEN

TRACK SELECT KEYS

1 - 9 : Tracks 1 - 9
A - Z : Tracks 10 - 35
Numeric 1 - 9 : Tracks 36 - 44
Numeric (: Track 45
Numeric) : Track 46
Numeric * : Track 47
Numeric / : Track 48

LIVE EDIT

RIGHT SHIFT : DELETE NOTES
CONTROL : RESTORE NOTES
ALTERNATE : VEL = 127
LEFT SHIFT : VEL = 64
ALT/L. SHIFT : VEL = 16

If VELOCITY PEDAL is active while LIVE EDIT is on, pressing ALTERNATE will set all note velocities from the velocity pedal.

CONTROL PANEL

F1 : EXIT
F2 : RECORD
F10/SPACE : PLAY
ESC : PAUSE
ENTER : STOP
. : TEMPO UP
, : TEMPO DOWN
UNDO : RE-RECORD
? : ERASE TRK
: : CONTROLLERS
' : AFTERTOUCH
" : NOTE OFF VEL
; : MIDI MERGE
BACKSPACE : ECHO
> : ECHO CHAN UP
< : ECHO CHAN DOWN
TAB : CUE
CRSR UP : START CUE UP
CRSR DOWN : START CUE DOWN
CRSR RIGHT : END CUE UP
CRSR LEFT : END CUE DOWN

AMIGA KEY SUBSTITUTIONS

Atari ST Amiga
UNDO : Right AMIGA key
INSERT : Right ALT key
CLR HOME : Shift-DEL
Numeric (: Numeric -
Numeric) : Shift-Numeric -
Numeric * : Numeric .
Numeric / : Shift-Numeric .

The four numeric key substitutions apply to the Amiga 1000 only.

TRACK MODE PLAY/RECORD SCREEN

TRACK OPTIONS

F3 : MUTE/UNMUTE
F4 : SET PUNCH
F5 : CLEAR PUNCH
F6 : ERASE PUNCH
F7 : COPY PUNCH
F8 : SOLO
F9 : SET SWITCH
F11 : SHIFT +1
F12 : SHIFT +3
F13 : SHIFT +12
F14 : SHIFT -1
F15 : SHIFT -3
F16 : SHIFT -12
F17 : EDIT SELECT
F18 : SWAP
F20 : NAME
CLR HOME : ERASE
ALTERNATE : MUTE ONLY
SHIFT : UNMUTE ONLY

HIDDEN CONTROLS

DELETE : ALIGN
RETURN: TRACK SWITCH
\ : TRACK MERGE
| : AUTO-RECORD
% : VISIBLE METRONOME
$: AUDIBLE METRONOME
! : ALL TRACKS TO SEQ
^ : TEMPO CHG BY RATIO
& : STEP DISPLAY
# : MUTE ALL TRACKS
@ : UNMUTE ALL TRACKS
* : EDIT/PUNCH BUTTONS
- : SILENT PUNCH
/ : CUE LOOP
] : CUE BACK 1 BAR
[: CUE BACK 2 BARS
` : CUE BACK 4 BARS
= : CUE BACK 8 BARS
INSERT : CUE MOVE AMOUNT
(: TRACK LOOP
) : FILTER
_ : FILTER CHAN DOWN
+ : FILTER CHAN UP
F19 : VELOCITY PEDAL
~ : PANIC BUTTON
0 : SET OPTIONS

OPEN MODE PLAY/RECORD SCREEN

SEQUENCE KEYS

1 - 9	: Primary sequences
A - Z	: Primary sequences
Numeric 00 - 92	: Secondary sequences
Numeric *	: Bank lock on
Numeric (	: Bank lock off

Pressing a sequence key will start that sequence looping. If a sequence is playing and is not in its last loop, pressing the sequence key will put it in its last loop. If a sequence is in its last loop, pressing its key will stop that sequence immediately.

Pressing SHIFT and a primary sequence key will mute that sequence.

HIDDEN CONTROLS

F1	: EXIT
LEFT MOUSE	: EXIT
ESC	: PAUSE
DELETE	: ALIGN
ENTER	: RECORD IMMEDIATE
RETURN	: RECORD ON NEXT EVENT
.	: TEMPO UP
,	: TEMPO DOWN
UNDO	: RE-RECORD /CANCEL
F10/SPACE	: END RECORD
:	: CONTROLLERS
'	: AFTERTOUCH
"	: NOTE OFF VEL
;	: MIDI MERGE
BACKSPACE	: ECHO
>	: ECHO CHAN UP
<	: ECHO CHAN DOWN
TAB	: CUE
CRSR UP	: CUE POINT UP
CRSR DOWN	: CUE POINT DOWN
CRSR RIGHT	: CUE SEQ UP
CRSR LEFT	: CUE SEQ DOWN
INSERT	: CUE MOVE AMOUNT
0	: SET OPTIONS
-	: PANIC BUTTON

SONG MODE PLAY SCREEN

SEGMENT KEYS

1 - 9 : Segments 1 - 9
A - Z : Segments 10 - 35
Numeric 1 - 9 : Segments 36 - 44
Numeric (: Segment 45
Numeric) : Segment 46
Numeric * : Segment 47
Numeric / : Segment 48

SEGMENT OPTIONS

F4 : PLAY IMMEDIATE
F5 : PLAY AFTER CURRENT
F6 : SET LOOP START
F7 : SET LOOP END

CHANNEL KEYS

1 - 9 : Channels 1 - 9
A - G : Channels 10 - 16

CHANNEL OPTIONS

F3 : MUTE/UNMUTE
F8 : SOLO
F9 : SET SWITCH

HIDDEN CONTROLS

F1 : EXIT
LEFT MOUSE : EXIT
F10/SPACE : PLAY
. : TEMPO UP
, : TEMPO DOWN
UNDO : STOP
RETURN : CHANNEL SWITCH
TAB : CUE
CRSR UP : CUE POINT UP
CRSR DOWN : CUE POINT DOWN
INSERT : CUE MOVE AMOUNT
CRSR LEFT : LAST SEGMENT
CRSR RIGHT : NEXT SEGMENT
F2 : LOOP CURRENT SEGMENT
\ : LOOP ON/OFF
; : MIDI MERGE
BACKSPACE : ECHO
> : ECHO CHAN UP
< : ECHO CHAN DOWN
0 : SET OPTIONS
- : PANIC BUTTON

STEP TIME RECORD SCREEN

SELECT KEYS

0 - 9 : Time
A - E : Time
F - T : Duration
U - Z : Velocity

A new value may be entered for any select key by pressing SHIFT and that key.

PLAY OPTIONS

F6 : PLAY TRACK/SEQ.
F7 : PLAY LAST 24 NOTES
F8 : PLAY LAST 8 NOTES
F9 : PLAY LAST 8 BARS
F10 : PLAY LAST 2 BARS
SPACE : PLAY LAST 2 BARS
TAB : PLAY LAST CUE

If the sequencer is playing in step time record, pressing F10 or SPACE will restart the sequencer.

CONTROL PANEL

F1 : EXIT TO EDIT
F2 : EXIT TO PLAY
F3 : REST
F4 : DUR FOLLOW
F5 : AUDITION VEL
RETURN : TIE
UNDO : DELETE LAST STEP
/ : TIME CHANGE DELAY
ESC : PAUSE
; : MIDI MERGE
BACKSPACE : ECHO
> : ECHO CHAN UP
< : ECHO CHAN DOWN
CRSR UP : DUR ADJUST +4
CRSR DOWN : DUR ADJUST -4
CRSR RIGHT : DUR ADJUST +1
CRSR LEFT : DUR ADJUST -1
- : PANIC BUTTON

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